PUBLIC VERSION

BEFORE THE
SURFACE TRANSPORTATION BOARD
STB Docket No. 42088

WESTERN FUELS ASSOCIATION, INC. AND
BASIN ELECTRIC POWER COOPERATIVE, INC.
v.
BNSF RAILWAY COMPANY

Reply Evidence and Argument of
BNSF Railway Company

NARRATIVE

Volume II of II

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ABBREVIATIONS

Terms:

AAR	Association of American Railroads
AFE	Authority for Expenditure
AREMA	American Railway Engineering and Maintenance of Way Association
Basin or Basin Electric	Basin Electric Power Cooperative
BN	Burlington Northern Railroad Company
BNSF	BNSF Railway Company
CFM	Cubic Feet Per Minute
CMP	Constrained Market Pricing or Corrugated Metal Pipe
CP	Control Point
CTC	Centralized Traffic Control
CY	Cubic Yard
DAF	Dissolved Air Flotation
DARA	Density Adjusted Revenue Allocation
DCF	Discounted Cash Flow
DED	Dragging Equipment Detector
DOT	Department of Transportation
EIA	Energy Information Administration
ENR	Engineering News Record Construction Cost Index
EPA	Environmental Protection Agency
FC	Foot Candles
FED	Failed Equipment Detector
FEMA	Federal Emergency Management Act
FRA	Federal Railroad Association
GMP	Gallons per Minute
GPD	Gallons Per Day
GPRM	Generalized Percentage Reduction Methodology
GTM	Gross Ton Mile
HAL	Heavy Axle Loading
HBD	Hot Bearing Detector

Terms:

IBC	International Building Code
ICC	Interstate Commerce Commission
ICS	Independent Control Switch
Laramie River	Laramie River Station
LF	Linear Foot
LMR	Land Mobile Radio
LRR	Laramie River Railroad
LRS	Laramie River Station
LUM	Locomotive Unit Mile
MGT	Million Gross Ton
MOW	Maintenance of Way
MP	Milepost
MSP	Modified Straight-Mileage Prorate
Nar.	Narrative
NORAC	Northeast Operating Rules Advisory Committee
NT	Net Ton
OTM	Other Track Material
PITO	Point of Intersection of Turnout
POTW	Publicly Owned Treatment Works
PPI	Producer Price Index
PRB	Wyoming Powder River Basin
PSI	Pounds per Square Inch
PSP	Plated Steel Pipe
RCAF	Rail Cost Adjustment Factor
RCAF-A	Rail Cost Adjustment Factor-Adjusted for Changes in Productivity
RCAF-U	Rail Cost Adjustment Factor-Unadjusted for Changed in Productivity
RCB	Reinforced Concrete Box
ROW	Right of Way
RPI	Road Property Investment
RSAM	Revenue Shortfall Allocation Method
RS Means or Means	RS Means Heavy Construction Handbook

Terms:

RTC	Rail Traffic Control
R/VC	Revenue-To-Variable Cost
SAC	Stand-Alone Cost
SARR	Stand-Alone Railroad
SEM	Switch Engine Minute
SF	Square Foot
SPP	Structural Plate Pipe
SY	Square Yard
UMF	URCS Master File
UP	Union Pacific
URCS	Uniform Rail Costing System
USGS	United States Geological Survey
VHF	Very High Frequency
WFA	Western Fuels Association, Inc.
WRPI	Western Railroad Property, Inc.
WWTP	Waste Water Treatment Plant

CASE NAMES

WTU	*West Texas Utilities Co. v. Burlington Northern R.R. Co.*, 1 STB 638 (served May 3, 1996)
APS	*Arizona Public Service Co. v. The Burlington Northern and Santa Fe Ry.*, STB Docket No. 41185 (served May 12, 2003)
Coal Rate Guidelines or *Guidelines*	*Coal Rate Guidelines, Nationwide*, 1 I.C.C.2d 520 (1985)
Coal Trading	*Coal Trading Corp. v. Baltimore & Ohio Railroad Co.*, 6 I.C.C. 2d 361 (1990)
CP&L/NS	*Carolina Power and Light Company v. Norfolk Southern Railway Company*, STB Docket No. 42072 (STB served December 23, 2003)
Duke/CSX	*Duke Energy Corp. v. CSX Transportation, Inc.*, STB Docket No. 42070 (served Feb. 4, 2004)
Duke/NS	*Duke Energy Corp. v. Norfolk Southern Ry. Co.*, STB Docket No. 42069 (served Nov. 6, 2003)
FMC	*FMC Wyoming Corp. v. Union Pacific R.R.*, STB Docket 42051 (served Sept. 13, 2001)
Interim Guidelines	*Coal Rate Guidelines, Nationwide*, Ex Parte No. 347 (Sub-No.1) (served Feb. 24, 1983)
AEP Texas	*AEP Texas North Co. v. The Burlington Northern and Santa Fe Ry. Co.*, STB Docket No. 41191 (Sub-No. 1) (served Mar. 19, 2004) (granting AEP Texas' Motion to Vacate)
Nevada Power	*Bituminous Coal – Hiawatha, Utah, to Moapa, Nevada*, 10 I.C.C.2d 259 (1994)
OPPD	*Omaha Power Dist. v. Burlington Northern R.R.*, 3 I.C.C.2d 123 (1986)
OPPD II	*Omaha Power Dist. v. Burlington Northern R.R.*, 3 I.C.C.2d 853 (1987)
PPL	*PPL Montana, LLC v. The Burlington Northern and Santa Fe Ry. Co.*, STB Docket No. 42054 (served Aug. 20, 2002)
PPL II	*PPL Montana, LLC v. The Burlington Northern and Santa Fe Ry. Co.*, STB Docket No. 42054 (served Mar. 21, 2003)
TMPA	*Texas Municipal Power Agency v. The Burlington Northern and Santa Fe Ry. Co.*, STB Docket No. 42056 (served Mar. 24, 2003)
TMPA II	*Texas Municipal Power Agency v. The Burlington Northern and Santa Fe Ry. Co.*, STB Docket No. 42056 (served Sept. 27, 2004)
WFA	*Western Fuels Association, Inc. and Basin Electric Power Cooperative, Inc. v. The Burlington Northern and Santa Fe Ry. Co.*, STB Docket 42088
WPL	*Wisconsin Power & Light Co. v. Union Pacific R.R.*, STB Docket No. 42051 (served Sept. 13, 2001)

CASE NAMES

Xcel	*Public Service Company of Colorado D/B/A Xcel Energy v. The Burlington Northern and Santa Fe Ry. Co.*, STB Docket No. 42057 (served June 7, 2004)
Xcel II	*Public Service Co. of Col. d/b/a Xcel Energy v. The Burlington Northern and Santa Fe Ry. Co.*, STB Docket No. 42057 (served Jan. 19, 2005)

F. ROAD PROPERTY INVESTMENT

BNSF's road property investment evidence is sponsored by the following experts: Robert J. Boileau, BNSF Assistant Vice President of Engineering Services (III.F Introduction and general oversight of preparation of III.F); Arnold S. Tesh of FTI Consulting, Inc. (FTI) (III.F.1 Land); Cassie M. Gouger, P.E. of FTI (all but III.F.7); and James Primm, Consultant (III.F.7 Buildings & Facilities) (together "BNSF Engineering Consultants"). BNSF Engineering Consultants have significant experience in railroad construction, as set forth in their statements of qualification contained in Section IV.

Under Mr. Boileau's supervision, this team of experts has reviewed WFA/Basin's road property investment evidence and concluded that WFA/Basin's proposed road property investment costs do not reflect accurately the costs to construct the lines that the LRR proposes to use for heavy haul coal traffic. In the introduction to BNSF's Reply Evidence, Mr. Boileau explains why SAC costs in general, and WFA/Basin's costs in particular, do not reflect the real-worlds costs, even when entry barriers are excluded. The specific problems with WFA/Basin's assumptions and development of costs are explained in detail in Sections III.F.1 through III.F.12.

For the reasons set out in Sections III.F.1 through III.F.12, the Board should apply BNSF's cost assumptions in carrying out its analysis of the stand-alone costs for the LRR. The differences between BNSF and WFA/Basin on the issues in dispute are set out in the table below.

Table III.F-1
Summary of BNSF's Estimate of Road Property Investment
for the Laramie River Railroad Versus Complainants' Estimate at 4Q2004 Levels

Road Property Investment Account	BNSF 2004 Amount ($Millions)	WFA/Basin 2004 Amount ($Millions)	Difference ($Millions)
III.F.1. Land	$7.34	$3.37	$3.96
III.F.2. Roadbed Preparation	$436.75	$146.14	$290.61
III.F.3. Track (Rail, OTM, Ballast)	$409.12	$300.53	$108.58
III.F.4. Tunnels	$28.66	$27.71	$0.96
III.F.5. Bridges and Culverts	$99.41	$69.88	$29.53
III.F.6. Signals and Communications	$68.82	$58.35	$10.47
III.F.7. Buildings and Facilities	$51.65	$26.50	$25.15
III.F.8. Public Improvements	$8.59	$7.50	$1.09
III.F.9. Mobilization/Demobilization	$33.95	$19.13	$14.82
III.F.10. Engineering	$110.30	$63.66	$46.64
Iii-F-11. Contingencies	$124.72	$63.66	$61.06
TOTAL	**$1,379.31**	**$786.43**	**$592.88**

Source: WFA/Basin Errata electronic workpaper "III - F TOTAL.xls," worksheet "TOTALS;" BNSF Reply Exhibit III.F-1.

Part One: Introduction: SAC Costs Do Not Reflect Real-World Costs

A. The Costs Proposed In SAC Cases Do Not Reflect Real-World Rail Costs To Replicate Modern Day Coal Lines

In SAC cases to date, the typical approach to developing the road property investment for a SARR has been for the complainant to attempt to identify, quantify and develop a cost for individual items or activities in the construction of the SARR. This bottom-up approach is intended to enable the complainant to design an efficient "least cost (theoretically) feasible SAC model." *Coal Rate Guidelines,* 1 I.C.C.2d 520 at 542. While the *Coal Rate Guidelines* require that the proposed SARR be "feasible" and place the burden on the complainant to defend its assumptions and costs, *id.* at 544, current application of SAC methodology has yielded "hypothetical least cost" railroads, but not "efficient" or "feasible" railroads by modern day standards.

There are three reasons for this result: (1) the current approach allows cherry picking of low unit costs for individual (single point) items or activities without consideration of whether they are feasible in the overall plan; (2) it allows use of construction standards and materials that might be acceptable on some rail lines, but inappropriate for heavy axle loading coal traffic, and (3) it allows the use of obsolete or in-place standards to construct a new railroad (the SARR) even though those standards have been upgraded for new construction today -- precisely because such upgrades are required to meet the demands of the traffic specified for the SARR.

BNSF Assistant Vice President of Engineering Services, Robert J. Boileau, recently made a presentation to the Board on the Orin Line or Joint Line, which comprises a large portion of the line being replicated by the LRR in this proceeding. Mr. Boileau's presentation included a summary of what it historically cost the railroad to build the majority of the coal line segments replicated by the LRR (the Orin Line or "Joint Line"), the continuing costs for capacity and infrastructure improvements to that line to meet increasing traffic demands, and what it would cost to replicate that line today to meet traffic demands for the future.[1] Mr. Boileau showed that the original construction of the Orin Line completed in the 1970s and early 1980s cost more than $120 million. An additional $160 million was spent between 1994 and 1999 for capacity improvements to meet the increasing coal traffic demands. BNSF's most recent capacity improvement, the triple tracking of the 14.2 mile segment of the Orin Line between Shawnee and Walker, is currently near completion and is budgeted at $36 million, and additional improvement projects are in the plans for the near future.

It is particularly appropriate to focus on the Shawnee to Walker project which reflects construction based on the standards BNSF and UP have found necessary to handle the

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[1] BNSF Reply electronic workpaper "PRB Presentation.pdf." The full version of the August 3, 2004 PRB Presentation is available on the STB website at: http://www.stb.dot.gov/filings/all.nsf/1b576897bccb78148525703e0063ae87/5de34f11222ef66185256ef60063134e/$FILE/211855%20-%20BNSF%20and%20UP.pdf.

tremendous volumes and heavy axle loading of the unit coal trains in the Powder River Basin. These new standards are based on years of experience and field testing to identify and find solutions for problems unique to the movement of PRB unit coal trains. These solutions include increased capacity, better soil stabilization, improved track materials, higher construction standards and more efficient equipment. These upgraded standards have proved essential to building a physical plant capable of withstanding the impact of heavy axle load 286,000-pound unit coal train traffic and to keeping that plant in condition to provide efficient operations for the continuous flow of traffic in the PRB. The costs on the Shawnee to Walker project were not incurred without reason -- they represent the real-world cost to build a plant capable of providing high quality service under the increasing demands of high volume, heavy loading unit train coal traffic.

Based on past experience and the Shawnee to Walker project, Mr. Boileau has estimated that the cost to construct the entire Orin Line today to meet the demands of future movements of unit coal trains would be $700 million or $2.5 million per track mile.[2] These costs do not reflect the costs of "entry barriers" that the Board's SAC test is supposed to eliminate. There is clearly something wrong with any construction cost estimate for a SARR handling heavy haul unit coal trains in the PRB that does not come close to this $2.5 million per track mile cost.

Mr. Boileau's comparison of SAC costs with the replacement costs for the Orin Line is a valuable exercise for determining whether SAC costing assumptions are producing valid SAC costs. The Orin Line is the heart of most SAC coal rate cases. It is, in fact, the existence of the Orin Line that makes possible the heavy coal traffic volumes selected by coal rate case complainants. And since the complainants have not selected historical volumes that traversed

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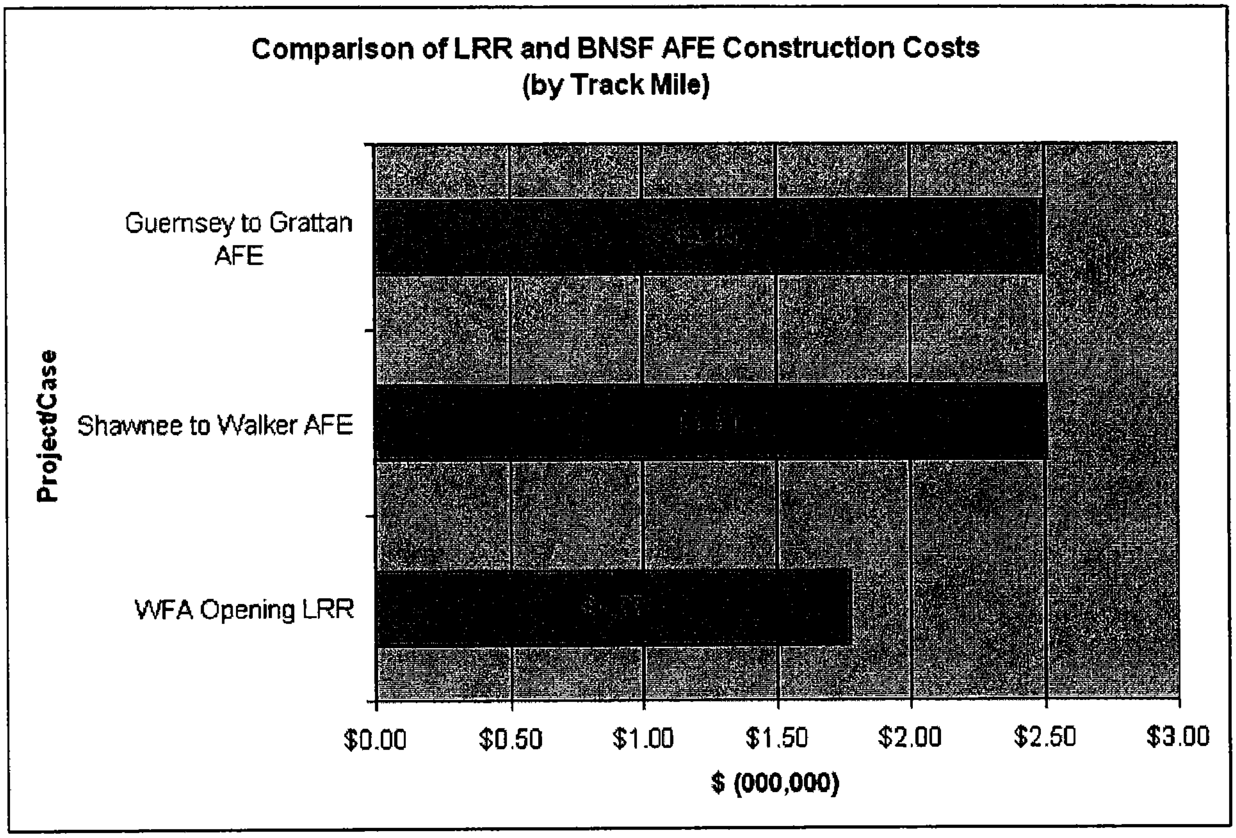
[2] *Id.*

the original Orin Line, but rather have assumed significantly increased traffic volumes projected for the future, current Orin Line projects constructed to handle such future loads are an appropriate benchmark for the cost to replicate the line.

Mr. Boileau's personal experience qualifies him to speak to the requirements for replicating the Orin Line. Mr. Boileau has been employed by BNSF or its predecessor BN for more than 27 years, including ten years working with structures, four years on MOW and 13 years on engineering and construction. He began his career with BNSF working on the construction of the Orin Line from Reno to Orin in 1978-1979.

Although Mr. Boileau estimated that to construct the Orin Line to the standards needed today and for the future would cost approximately $700 million, or nearly $2.5 million per track mile, complainants' costs to replicate these lines fall short of the mark, as shown in the charts below.

Chart III.F-1. Cost Per Track Mile For Total Project Construction Costs

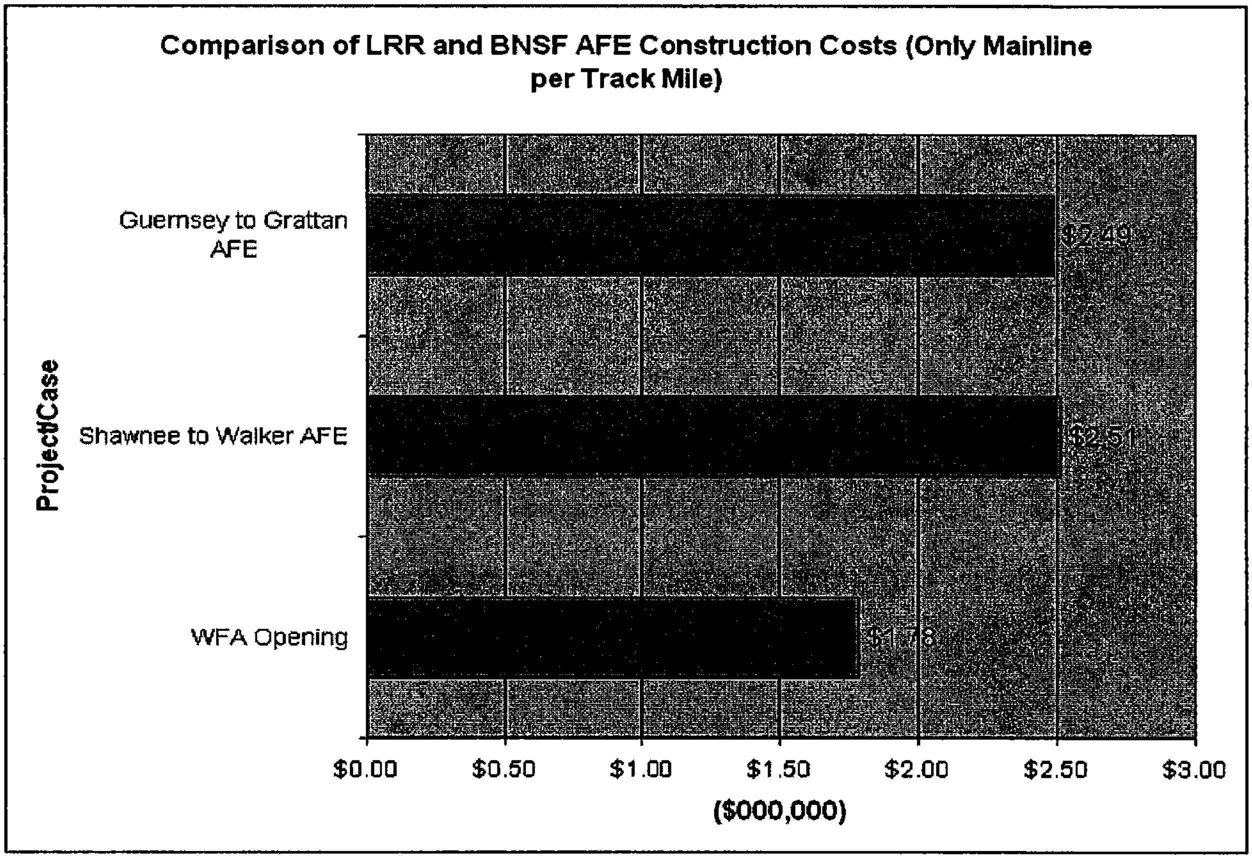


Source: BNSF Reply electronic workpaper "III F Intro Charts.xls."

Chart III.F-1 above compares the WFA/Basin cost per track mile for total RPI costs for the LRR with BNSF construction costs on most recent capacity improvements on the Orin Line. As can be seen, WFA/Basin's Opening Evidence on road property investment cost is far below the real-world replacement costs.

One might argue that the comparison of the construction costs on per-mile basis for the two recent BNSF line capacity improvement projects presented in Chart I with the construction costs on a per-mile basis for complainants' construction of the LRR is not valid because the BNSF projects did not include the acquisition of land, or the construction of yards and facilities. Chart III.F-2 below compares only *the mainline track costs* for the LRR as posited by WFA/Basin with the BNSF Orin Line/coal line construction projects – *i.e.,* costs for land, yards and facilities were removed from WFA/Basin's estimate of the LRR costs in order to develop a more accurate comparison with the BNSF capacity improvement projects.

Chart III.F-2. Cost Per Track Mile for Mainline Construction



Source: BNSF Reply electronic workpaper "III F Intro Charts.xls."

The chart shows that removing the costs for land, yards and facilities -- which are not typically part of the track capacity improvement costs -- from the WFA/Basin LRR costs produced very little change in the cost per track mile in WFA/Basin's Opening Evidence. Under either comparison, the WFA/Basin estimate lags far behind current replacement costs.

There are, to be sure, some differences in construction techniques for capacity improvements that will produce costs that vary slightly from new construction. For example, capacity improvements may incur some increased grading and track laying costs caused by delays associated with construction under traffic or additional signal costs to tie signals for the new tracks into the existing system. There are, however, areas where costs are significantly lower. For example, construction of additional mainline track on an existing right-of-way requires far less investment in property acquisition -- the purchase of right-of-way for the original construction in most instances would have included most of the right-of-way needed to accommodate future expansion. In addition, the costs for grading activities such as clearing and grubbing and topsoil removal and replacement often are significantly lower as a much smaller area is involved and the more difficult clearing of the land would have been done during original construction. In some cases, but not all, additional track requires less utility relocation and less fencing because the major effort for those projects would have been handled during the initial construction. Likewise the cost for culverts is lower because the installation of additional track requires only the extension of existing culverts. The shorter culvert extensions result in lower materials and installation costs as compared with new construction. Also, a line capacity improvement project generally does not require the construction of yards and facilities, which are essential components of a new railroad construction project. And finally, transportation costs can be reduced substantially for a line capacity improvement due to easier access to railroad supplied materials for track and bridge construction. Thus, overall real-world capacity improvement project costs should be directly comparable -- on a per-mile basis -- to new construction costs.

B. The Real World Shawnee To Walker Costs Reflect Real-World Standards For New Construction Of Coal Lines

The Shawnee to Walker project incorporates the most up-to-date standards, practices and improvements for the construction of rail lines designed for high density, heavy axle load (286,000-pound) unit coal trains. These standards and practices greatly increase efficiency and productivity in the construction of the railroad as well as in railroad operations. While the BNSF

Engineering Department maintains responsibility for the overall management of the Shawnee to Walker project, it subcontracted Design, Environmental Permitting and Construction Management to engineering companies through a competitive bid process. Competitive bids were also solicited for grading and structures projects.

BNSF employees are being used for the track construction and signal work on the Shawnee to Walker project. While BNSF generally does not contract out track and signal work due to union restrictions, in Mr. Boileau's experience, the labor costs have not been significantly different on those projects where BNSF has contracted out (such as for the BNSF track construction project at Joliet, Illinois and for the Alameda Corridor project in California). BNSF's track and signal employees are skilled, professional and efficient.[3]

The Shawnee to Walker roadbed is built on a 2:1 slope for fills and 3:1 for cuts. Significant ditches for drainage are being constructed to keep the subgrade drained. Thirteen-foot access roads are also being constructed adjacent to the track subgrade. BNSF has found over the years that these roads (which were to a lesser extent included in the original Orin Line construction) are essential for efficient operations. They are used by the transportation department to facilitate crew changes, by mechanical forces to respond to broken drawbars and

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[3] Complainants in SAC cases have purported to avoid union labor as a means of lowering costs, but it is it unrealistic to assume that this entire project would be built by contractors who did not use union labor. In fact, the contractors BNSF has used have also used union labor. Union labor is a fact of life for any Class I railroad. Moreover, there is no basis for assuming that non-union labor could be obtained at rates below those paid to BNSF's employees. BNSF's track construction employees are paid a wage that compensates them for the quality of work they provide. There is no reason to believe that non-union workers paid significantly less than what BNSF pays its employees would produce the same quality of work as BNSF highly trained professionals do, and lower quality work means additional costs would be incurred over time to compensate for the shortfall in quality. The Board should not seriously consider accepting low SAC cost estimates – and thereby reduce BNSF's rates – based on an unsupported assumption that BNSF pays its track labor force too much.

other equipment failures, by MOW forces to respond to track lights, broken rails and other service interruptions, and by outside contractors, such as propane distributors, that are not allowed to hyrail on BNSF tracks. The use of access roads improves efficiency because there is much less impact to operations if railroad personnel and outside contractors drive directly to the location rather than tying up track time by hyrailing. This is critical in the PRB where traffic volumes are high and there is very little available track time.

The track work includes heavy-duty 141-pound rail on concrete ties. Concrete ties are used for durability on heavy axle load segments. Most of the original wood ties on the existing tracks have been replaced with concrete and BNSF now has concrete ties on all of the Campbell Subdivision and 90 percent of the Orin Subdivision lines being replicated by the LRR.

Based on experience and research for construction of rail lines that can hold up under the continuous pounding of heavy axle loadings (HAL), both UP and BNSF standard track sections for HAL line segments include 141-pound rail, concrete ties on 24-inch centers, 12 inches of ballast under concrete ties, concrete crossings and movable point (Swing Nose) frogs.[4] Swing Nose Frogs reduce impact and the battering of the frog and point, which extends the life and reduces maintenance.

For efficiency, BNSF track centers are 25 feet apart to allow work on the track while traffic continues to move on the adjacent track at track (unrestricted) speeds. Tracks that were previously built on 15-foot track centers are being widened to 25 feet on the Shawnee to Walker project and all future projects. BNSF is also working to improve insulated joints, which is a weak link within the rail infrastructure.

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[4] BNSF Reply electronic workpaper "PRB Presentation.pdf."

BNSF signal work on the Shawnee to Walker line includes installation of CTC with power switches. Crossovers are all equipped with Independent Crossover Switches (ICS) to allow work to be performed on one end of the crossover while maintaining clear signals on the opposite track. While ICS is significantly more expensive than regular crossover controls, an additional $110,000 per crossover, the use of ICS provides large productivity improvements for both operating and maintenance of way.

As noted above, these standards were not developed to "gild the lily" but to provide a physical plant that can withstand the heavy loadings and continuous use involved in meeting the demands of unit coal train traffic.

C. WFA/Basin's Cost Estimates Do Not Reflect Real-World Costs

In his review of evidence submitted by the complainants in this case, and costs accepted by the Board in other cases, Mr. Boileau has concluded that the approach used in the SAC methodology does not accurately represent the costs incurred by Class I railroads constructing high density lines to modern day standards. First, misplaced emphasis on "least cost" has led to the acceptance of costs that do not reflect real-world construction costs. For example, as discussed more fully in Section III.F.3.d, in selecting their unit costs for the various types of LRR rail, WFA/Basin did not use the costs that were in the 2004 AFEs from which they selected other unit costs, but instead took a unit cost from a BNSF price list dated January 1, 2004 that did not yet reflect the increased price of rail that occurred in the latter part of 2003. BNSF updates its price lists during the first quarter to reflect changes from the prior year. The list as of January 1, 2004 would not yet have been updated. The correct prices, however, were captured in the 2004 BNSF AFEs that WFA/Basin used as sources for other 2004 unit costs, but WFA/Basin ignored them.

Second, the concept of "feasibility" under SAC methodology allows complainants to promote standards and materials that are inappropriate for the coal lines being built. For example, as discussed more fully in Section III.F.3.c, WFA/Basin built the entire LRR with only two spikes per tie plate based on a spiking pattern for lines that do not have to support the continuous cycling of heavy coal trains. That pattern is not adequate to support PRB coal traffic.

Third, WFA/Basin propose to build the LRR, which is expected to serve exclusively high volumes of heavy axle loading coal trains, to standards used in the past, but which have been upgraded for new construction as experience proved the earlier standards to be inadequate. As a result, the concepts of "least cost" and "feasible" as applied under SAC methodology do not promote the construction of an efficient railroad that can ensure the availability of a physical plant adequate to meet the anticipated future traffic demands. Each of these flaws is discussed in more detail below.

1. Cherry Picking Low Costs for Individual Items Results in Unrealistic Total Costs

The process by which SAC costs are estimated produces cost estimates that do not reflect accurately the cost to replicate the Orin Line. Mr. Boileau has observed from Board decisions in other BNSF SAC cases that proponents of a SARR often select costs haphazardly from a variety of unrelated sources without considering whether the sum of individual costs yields an accurate or even feasible total project cost.

For example, cherry picking unit prices from various bid packages, even if for the same project, does not yield an accurate estimate of the total bid project. A contractor will spread his costs across various bid items based on that contractor's particular circumstances. For instance, a contractor who has just finished a project that is similar to and in close proximity to the proposed bid project will be able to offer a lower unit cost for some items if he can use the equipment and labor forces already assembled for the earlier project. In other instances, a contractor may have materials in stock that reduce both his materials and transportation costs. A particular low cost that was cherry picked from a contractor's bid may not actually reflect the costs that the SARR would incur.

Selecting individual costs from different projects, as opposed to different bids for the same project, creates additional anomalies. Costs for what appear to be the same line item in bids for different projects in fact may not be at all comparable. For example, as in the case of the original Orin construction and the more recent Shawnee to Walker project, bid specifications may differ. Some bid specifications require breakout of individual parts of a line item, while others require consolidation of related activities. The original Orin Line construction documents required consolidation of grading activities such as topsoil removal and foundation conditioning with excavation, whereas the Shawnee to Walker specifications required separate bid items for excavation, topsoil removal, foundation conditioning and undercutting. Likewise, some projects require the contractor to supply materials as well as labor and equipment, while others rely on the owner railroad for materials. Finally, because contractors have great flexibility to allocate their costs across the various bid items, some may choose to charge higher costs for tasks performed in the initial stages of construction in order to receive greater payments up front.

Mr. Boileau knows from personal experience that in selecting a contractor, BNSF (like other Class I railroads) does not focus on individual line items, but on the total bid package. In general, the contractor whose total bid represents the lowest overall cost consistent with quality and timely work is selected, even if some of the individual costs submitted by that contractor are considerably higher than those of other bidders. In the real-world, no single contractor offers the lowest cost for every item. Yet, cherry picking from various sources to obtain the least cost for each item is precisely the unrealistic approach taken in SAC cases. WFA/Basin's selection of their rail unit prices discussed above is a clear example of cherry picking. The rail prices were the only prices that WFA/Basin selected from the price list, even though it was clear from the 2004 AFE data that those prices were not available in 2004.

WFA/Basin's selection of grading costs in this case provides a different example of how this least cost philosophy (which is just an excuse for cherry picking) permeates not only the selection of unit costs, but the selection of sources from which to obtain unit costs. As discussed more fully in Section III.F.2, WFA/Basin selected unit costs for excavation and embankment from the Shawnee to Walker project, but excluded additional costs for topsoil removal, undercutting, and foundation conditioning (all of which are included in the Shawnee to Walker document as separate bid items). Their basis for exclusion is that BNSF has not proven that these activities were needed on the Orin Line, apparently because the original Orin Line construction documents do *not* list these activities as separate bid items. WFA/Basin further assert that "[t]he BNSF materials [produced in discovery]...show that other roadbed preparation items previously rejected by the Board, such as stripping, should continue to be excluded from the roadbed calculation costs" *id.*, but they do not provide any BNSF materials that back up that statement. Their "evidence" consists entirely of their erroneous allegation on page III-F-19, that "BNSF has not shown that stripping is required on the Orin Line" and that costs for undercutting should be excluded because "the Board has repeatedly rejected such unnecessary, additional costs" in other cases. *Id.*

The BNSF materials, in fact, show just the opposite as the "other roadbed preparation items" are individually listed in the Shawnee to Walker bid document from which WFA/Basin selected their excavation and embankment unit costs. These include "topsoil removal" (*i.e.*, removal of the top six inches or stripping *apart from* excavation), "excavation of unsuitable" material (*i.e.*, undercutting), and "overexcavation" of both excavation and embankment (*i.e.*, foundation conditioning).[5] These activities also are clearly identified in the schematic of the "Shawnee to Walker Typical Cross Section" included in Mr. Boileau's August 2004 presentation to the Board. The schematic marks the areas for "foundation prep." on the embankment, for "18" overexcavation" on the excavation segments of the roadbed, and for "6" topsoil removal."[6] The bid documents and cross section schematic support inclusion of these activities in SAC costs.

Nevertheless, WFA/Basin selected from the Shawnee to Walker project only the unit costs for excavation and embankment (which do not cover these other activities) based on the fact that the other activities were not listed as bid items in the original Orin Line documents (although the costs for them would have been accounted for in the excavation and embankment unit costs for that project.) Thus, WFA/Basin selected as the basis for their total common earthwork cost a low unit cost for excavation that does cover the costs for the other activities, based on the specifications for another project (the original Orin construction) where those costs were simply lumped into the overall excavation costs.

The Shawnee to Walker project was not designed and bid out for litigation purposes, but on the basis of what real-world engineers and contractors know needs to be done. Inclusion of costs for activities other than excavation and embankment in SAC costs is not "unnecessary gold-plating," but an accurate representation of what is actually required. WFA/Basin's

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[5] WFA/Basin Opening electronic workpaper "walker to shawnee unit costs.pdf."

[6] BNSF Reply electronic workpaper "PRB Presentation.pdf."

argument for exclusion of these activities has no merit, but is simply a means of reducing grading costs under the guise of creating a "least cost" railroad.[7]

Finding the lowest costs for individual items from various bids or sources without proper consideration of the circumstances underlying those costs can result in a distorted estimate for total project costs that would not be replicated on an actual construction project. This can be illustrated by examining cost estimates provided in the actual construction bids from five contractor bids solicited by BNSF in 1998 for construction activities on a railway bridge located on BNSF's Clovis Subdivision. The cost for the contracted activities in the five bids submitted[8] ranged from ${ } to ${ }, with an average cost of ${ }.

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[7] Complainants in prior cases have also argued against soil stabilization measures such as undercutting and foundation conditioning that BNSF claimed were necessary to support the roadbed and which BNSF undertook after the original construction of the Orin Line when they realized the problems associated with the heavy unit coal trains. In some instances, complainants have claimed that BNSF's problems were due to poor construction and that such problems did not occur on the WRPI line. Such arguments, however, do not support eliminating soil stabilization on the line. A 1989 article on the Orin Line attributes WRPI's success in avoiding such problems to its learning from BNSF's experience the importance of undercutting and foundation conditioning.

> North Western learned from Burlington Northern's experience. BN had laid the Orin Line atop native soil, hastening the rise of dirt into the ballast. Once North Western finished grading, it replaced unstable soil with other material and packed this subgrade to maximum density. Then it rolled an eight-inch-thick mat -- a combination of aggregates and crushed fines from ballast -- onto the ground. When rains fell, the mat set like concrete, creating a thick barrier that prevents water from seeping into the subgrade and keeps dirt from percolating up."

"A Niagara of Traffic from a Wyoming County the size of Connecticut," by Fred Frailey, Trains, p. 54, November 1989. BNSF Reply electronic workpaper "BNSF Article.pdf."

[8] Bids for the bridge construction were solicited as part of the construction of a line segment in New Mexico. The five project bids submitted for all construction activities on the line segment ranged from ${ } million to ${ } million. BNSF provided the bridge components.

Comparison from bid to bid reveals a range of component costs for key aspects of the same bridge project. As shown in Table III.F-2, the ranges of unit costs for each of the bid items vary greatly, even though the variance in the "bottom line" total construction cost for the five bids is quite minimal. In other words, each contractor essentially takes a different path to arrive at a similar endpoint.

In Table III.F-2 below, "Lowest Unit Cost" represents the lowest of the estimates received for that work item, regardless of which contractor submitted it, and "Highest Unit Cost" similarly represents the highest estimate received for that item. As expected, no one contractor submitted either the lowest or the highest unit costs for all the items. For example, for soil cement, the contractor labeled "Contractor C" in the table submitted the bid containing the lowest unit cost (${ }/CY), while "Contractor D" submitted the highest unit cost (${ }/CY). However, "Contractor C" also had the *highest* unit cost for a different item (Portland cement concrete, at ${ }/CY), while still a third contractor ("Contractor A") had the lowest unit cost for Portland cement concrete (${ }/CY).

Table III.F-2
Summary of Received Bids for BNSF Bridge

Item	Unit	Qty	Lowest Unit Cost	Highest Unit Cost	High as a Multiple of Low	Low-Cost Contractor	High-Cost Contractor
Superstructure construction	LS	1	${ }	${ }	4.5X	B	A
Pile Driving	LF	450	${ }	${ }	7X	A	E
Pile Lugs	EA	10	${ }	${ }	3.7X	A	C
Soil Cement	CY	387	${ }	${ }	2.9X	C	D
Portland Cement Concrete	CY	100	${ }	${ }	2.7X	A	C
Reinforcing Steel	CY	1600	${ }	${ }	4.6X	A	D
Class D Riprap	CY	200	${ }	${ }	3.1X	E	B
Sand Bedding	CY	20	${ }	${ }	3.5X	E	B

Item	Unit	Qty	Lowest Unit Cost	Highest Unit Cost	High as a Multiple of Low	Low-Cost Contractor	High-Cost Contractor
Filter Fabric	SY	510	${ }	${ }	8.6X	A	B
Total Bridge Costs			**${ }**	**${ }**	**1.1X**	B	A
Source: BNSF Reply electronic workpaper "III F Intro Bridge.pdf."							

As is presented in the cost table, for this bridge project, the highest unit cost for any one item could be as much as 8.6 times as much as the lowest (for filter fabric). The *smallest* variance between low and high unit cost for an item listed in the table was 2.7 times (for Portland cement concrete). Yet despite these line item differences from bid to bid, the highest *total* bid among the five was less than 1.2 times greater (114% higher) than the lowest total bid.

The pattern of costs for the bridge construction work items in the actual BNSF construction bids demonstrates the high level of inaccuracy that can result from simply picking the lowest or near lowest cost on each of the various items without considering the impact of other bridge project items. If the lowest cost for each item from each of the five contract bids were selected, the result would be a total construction cost for the bridge project of ${ }. This is 45% lower than the average contractor bid cost of ${ }, and 41% lower than even the *lowest* total cost of ${ } from any one bid. While each individual cost could be justified as *possible,* the selection of the lowest costs from different bids distorts the results obtained from actual experience and generates an infeasible bridge estimate.

This same contrast between the range of estimates on individual items and the range of the overall cost estimates is seen in other bids. For example, if one takes the lowest bid for each item from the three contractor bids covering grading and structure construction for the Shawnee to Walker project, the total cost would be 12-13% lower than the lowest bidder (depending on which subballast material -- item 12 or 12a -- is chosen) and 21-22% lower than the average ${ } of the three bids, and 26-28% below the highest bid.

Table III.F-3.
Summary of Received Contractor Bids for Shawnee to Walker Project

Total Contractor $	**Sum of all**	**Low Bidder**			
	Low Bids	**A**	**B**	**C**	
Total Using 12	${ }	${ }	${ }	${ }	
Total Using 12a	${ }	${ }	${ }	${ }	
Result of using all Low Bid Costs for 12		Only { }	of lowest bidder's cost captured by using all lowest bid costs		
Result of using all Low Bid Costs for 12a		Only { }	of lowest bidder's cost captured by using all lowest bid costs		
Contractor	**Low Bid Amount**	**% of Low Bid**	**Items**	**% of Items**	
A	${ }	{ }	{ }	{ }	
B	${ }	{ }	{ }	{ }	
C	${ }	{ }	{ }	{ }	
Totals	${ }		{ }		
Source: BNSF Reply electronic workpaper "III F Intro Shawnee Bid.pdf."					

The highest total bid is only { } percent higher than the lowest total bid for the Shawnee to Walker project. Moreover, as shown in the table above, the lowest bidder was clearly not the lowest bidder on all items. In fact, although he was the lowest bidder for { } percent of the { } bid items, the other two contractors presented the low bids that comprised { } percent of the total of the low bid using all lowest bid prices.[9]

Analyses of contractor bids for other recent BNSF line capacity projects (on the Panhandle Subdivision) produce similar results. For example, the three contractor bids for the Clear Creek to Canadian double track project produced total bid costs that varied by only { }

[9] BNSF Reply electronic workpaper "III F Intro Shawnee Bid.xls".

percent, but the high bids for the individual line items ranged from { } to { } times the corresponding low bids. { } percent of the bid items for that project varied by more than 100 percent. The total project bid using all of the lowest cost items would have resulted in a project cost that was { } percent below the *lowest* bidder and { } percent below the average of the three bids.

For the Coburn to Clear Creek segment, total bids from the same three contractors varied by { } percent with the high bids on individual line items ranging from { } to { } times the corresponding low bids. { } of the { } individual bid items varied by more than 100 percent. The total bid using all of the lowest bid prices for this project would have resulted in a cost that was { } percent lower than the lowest bid and { } percent lower than the average of the three bids.[10]

Table III.F-4
Comparison of Received Bid Totals for Coburn to Canadian Segments on Panhandle Subdivision

Clear Creek to Canadian					
	Sum of all Low Bids	**Low Bidder A**	**B**	**C**	**Average**
	${ }	${ }	${ }	${ }	${ }
Result of using all Low Bid Costs	{ }%	Lower than Lowest Bidder			
Result of using all Low Bid Costs	{ }%	Lower than Average of All Bids			
Coburn to Clear Creek					
	Sum of all Low Bids	**A**	**B**	**Low Bidder C**	**Average**
	${ }	${ }	${ }	${ }	${ }
Result of using all Low Bid Costs	{ }%	Lower than Lowest Bidder			
Result of using all Low Bid Costs	{ }%	Lower than Average of All Bids			
Source: BNSF Reply electronic workpaper "III F Intro Coburn-Canadian Bid.pdf."					

[10] BNSF Reply electronic workpapers "III F Intro Coburn-Canadian Bid.xls" and "III F Intro Coburn-Canadian Bid.pdf."

These analyses confirm what is intuitively obvious -- the sum of the lowest costs selected from various sources for individual cost items will not yield a realistic total cost. A cost estimation methodology that emphasizes the least cost for the items and activities involved in construction of a railroad fails to recognize the distortions that result from such a process. The resulting cost estimate bears little resemblance to a realistic estimate for a feasible SARR.

2. The Concept of "Feasibility" Is Often Used to Justify Use of Standards and Materials that are Acceptable on Other Lines, But Not Appropriate or Efficient for High Density Coal Lines

Mr. Boileau has observed that complainants justify the use of standards and materials that are not appropriate or efficient on coal rail lines on the grounds that they are used elsewhere on BNSF or other railroads, and thus their use is "feasible." This concept of feasibility results in costs that do not accurately reflect real-world practices. For example, WFA/Basin cited two photographs that they claim support the use of two spikes per tie plate (although at least one of the photos suggests a third spike is used but not shown). BNSF's standard on heavy loading coal lines where wood ties are used is four spikes per tie plate. The use of a lower standard on another line, or even an occasional substandard occurrence on some area of the Orin Line, does not justify lowering the standard for the entire LRR.

Another example is WFA/Basin's use of rubber/asphalt crossings which are durable enough on many rail lines, but which are not efficient on PRB coal lines. Concrete crossings are used on coal lines because concrete crossing panels withstand excessive traffic loads (such as 286,000-pound coal cars) and also allow for quick installation and removal of individual panels to perform routine maintenance.

A third example is WFA/Basin's omission of yard limit signs, advance warning signs, speed signs, and FRA-required 1-800 number signs. WFA/Basin claim that because the NORAC rules (which are not the rules by which western railroads operate) suggest that it is sufficient to have information about track speeds and yard limits in the time schedules, there is no need for signs. Even if that were true for eastern railroads traversing more highly populated areas with more clearly defined landmarks, train crews on the wide open landscapes of the Wyoming PRB rely on these signs, particularly in snow, ice, dust storms, and at night. The standards, practices and materials used on a SARR replicating a coal hauling railroad in the PRB should reflect the real-world requirements for such a railroad.

3. A SARR Being Built to Serve Traffic In the Future Should Be Constructed to the Standards for New Construction Today Rather than to Standards Used Previously That Are Being Upgraded.

The standards and materials BNSF uses for capacity improvements on the Orin Line reflect what is needed today to construct a real-world railroad capable of handling heavy axle loads in the future. They are based on years of experience dealing with problems encountered in the construction and maintenance of the Orin Line and developing the most efficient ways of addressing those problems. Because these higher standards require higher cost materials and more extensive roadbed preparation, costs of new construction have increased over the years since the Orin Line was first built. But these higher initial costs for improved construction methods and materials yield significant benefits. The railroad can handle increasingly heavy axle loads with much less damage to infrastructure and equipment, leading to more efficient service, reduced maintenance and lower replacement costs over the long run.

Proponents of SARRs do not attempt to build to standards that will handle the traffic they project in the future, but to standards that have been used in the past either on the original Orin Line, the WRPI line, or existing standards that are in the process of being upgraded. For example, complainants use a 24-foot roadbed width even though it is clear from experience that a

28-foot roadbed is necessary. They construct on 136-pound standard rail because much of BNSF's system has 136-pound rail, an improvement over the original construction of 132-pound standard rail which time and experience have shown was inadequate for the increasing traffic loads. BNSF is now converting to 141-pound rail to meet the future traffic needs, but complainants' SAC costs continue to reflect the old standards, including the use of wood ties.

The reason BNSF is changing to 141-pound rail, concrete ties, independent crossover controls, 25-foot track centers with 13-foot access roads, concrete crossings, closer spacing of FEDs, better draining ditches, and better grading practices is precisely because experience has shown that such changes are necessary to provide an available physical plant that can provide efficient, reliable service. Obviously, BNSF cannot update all line segments simultaneously, but it is committed to systematically upgrading its high density heavy axle loading coal lines through the implementation of new technology and materials to provide a physical plant with capacity and strength to meet the demands for high quality (on-time performance) service to its coal customers. In the real world, the replacement cost for the Orin Line and other high density coal-hauling lines would be based on the cost to build the railroad with the construction standards and materials found to be necessary to withstand such loads today -- not on the basis of what was built in the past. Accordingly, the costs would reflect the costs incurred for current construction projects such as the Shawnee to Walker project.

The use of lower standards and/or outdated materials to build an allegedly least cost efficient railroad results only in achieving lower costs -- it is not efficient. Conducting operations over such a plant would not provide the consistent reliable on-time performance that customers demand of a Class I coal-hauling railroad. As a result, the road property investment in a SAC case does not reflect accurately the costs to construct a railroad that could handle the traffic the SARR purports to service. The real-world rates that BNSF charges customers who receive the benefits of BNSF's real-world investments are thus reduced to a level that no longer comports with the service that BNSF actually provides. Rather, the rate levels are set to cover the costs of the infrastructure and service associated with a "hypothetical least cost" railroad – an infrastructure and service level that is not comparable to that provided today and which BNSF could not provide in the real world and still meet the present and future demands of its traffic and customers.

Part Two: BNSF's Reply to WFA/Basin's Opening Evidence on Road Property Investment

BNSF's Reply Narrative on Road Property Investment discusses each of the major categories of engineering and construction costs identified by the Board in its March 12, 2001 decision in STB Ex Parte No. 347 (Sub-No. 3), *General Procedures for Presenting Evidence in Stand-Alone Cost Rate Cases*. Consistent with the Board's guidelines for filing SAC evidence, the Reply Narrative is organized into sections addressing the following topics:

1. Land.

2. Roadbed Preparation. This topic covers the many grading activities involved in preparing the roadbed upon which the track will be constructed. These activities include clearing and grubbing, excavation (earthwork), placement of embankment, lateral drainage, culverts, and other necessary items.

3. Track Construction. This topic covers the rail, ties, ballast and other track material used in constructing the railroad. It also includes costs for transportation of materials from suppliers to the site and labor and equipment for construction.

4. Tunnels. This section covers tunnels and similar structures.

5. Bridges. This section covers the design, specifications and methodology for costing construction of bridges on the LRR.

6. Signals and Communications Systems. This section covers the Centralized Traffic Control (CTC) system, Failed Equipment Detectors, and the Microwave and Land Mobile Radio (LMR) systems needed on the railroad to provide essential communications.

7. Buildings and Facilities. In addition to the headquarters, crew, yard and MOW offices on the LRR, this section includes discussion of the costs to construct the fueling facilities and a locomotive shop.

8. Public Improvements. Under this heading, fences, signs, road crossings and crossing warning devices are discussed.

9. Mobilization. Under this heading, the costs for mobilizing and demobilizing laborers and equipment involved in the construction of the railroad are discussed.

10. Engineering. This section covers discussion of the costs involved in providing engineering services to plan, design and oversee construction of the railroad.

11. Contingencies. This heading includes a discussion of the necessity of providing a contingency additive to the estimated construction costs to account for unplanned events.

12. Construction Schedule. This section includes a discussion of deficiencies in WFA/Basin's proposed schedule.

Under each heading and subheading, BNSF Engineering Consultants discuss WFA/Basin's inclusion (or omission) of items covered under that category heading, as well as WFA/Basin's selection of construction specifications, quantities and unit costs for each component. Where WFA/Basin's selection of an item, specification, quantity or unit cost is well supported and feasible, BNSF Engineering Consultants have accepted it; where WFA/Basin have failed to include an item, or to support their selection, or the selection is infeasible or impractical, they have substituted a more appropriate selection.

The LRR is assumed by WFA/Basin to replicate the Joint Line[11] and BNSF's coal-hauling lines within the Powder River Basin in Wyoming. The LRR's route is 217.92 miles long and extends from Eagle Butte Jct., WY, on the north to Guernsey and Moba Jct., WY on the south. WFA/Basin Opening Nar. at III-B-1. From Donkey Creek, WY, the LRR mainline proceeds south to East Guernsey, WY, replicating BNSF's Orin and Canyon Subdivisions. This

[11] Joint Line is in reference to the portion of the Orin and Reno Subdivisions over which both BNSF and Union Pacific Railroad have operating rights.

route encompasses the Orin Line or Joint Line originally built in 1979 and improved throughout the past three decades specifically to handle heavy unit trains of coal. The LRR assumes the traffic levels and all of the essential facilities of a Class I railroad.

As a guiding principle for the construction of a railroad with the tonnage and traffic proposed for the LRR, BNSF Engineering Consultants have relied on current real-world specifications, including BNSF, industry and AREMA standards.

As shown in Table III.F-1 above, and in more detail in BNSF Reply Exhibit III.F-1, WFA/Basin has *understated* the reasonable construction costs that would be incurred to construct the LRR by $592 million.

1. Land

WFA/Basin rely on the testimony of Mr. Robert Brockman in support of their land property valuation. Mr. Brockman is a real estate appraiser from the Keyhole Land Company in Wheatland, Wyoming. His background appears to be in rural and farm appraisals for banks and law firms.[12] He does not appear to have had any experience valuing real estate for railroads.

As mentioned above, BNSF's land testimony is sponsored by Arnold Tesh. Mr. Tesh is a real estate consultant and Director of Real Property at FTI Consulting, Inc. ("FTI"). Mr. Tesh has been valuing real estate for 40 years, including over 28 years spent performing property appraisals for use by railroads. There is not another appraiser in the country who has valued more railroad property than he has. Mr. Tesh was the real estate expert for the federal government in the proceedings that created Conrail. During that proceeding, he directed the valuation of nearly 24,000 miles of railroad in 17 states, the District of Columbia, and two Canadian provinces, comprising the lines of the Penn Central, Erie Lackawanna, Central of New

[12] WFA/Basin Opening Nar. at V-52 to 53.

Jersey, Ann Arbor, Lehigh Valley, Reading, and Delaware and Hudson railroads. He has also performed real property appraisals for railroad lines used by Amtrak, Union Pacific, Southern Pacific, Illinois Central Gulf, Santa Fe, Burlington Northern, CSXT, Alaska and other railroads. Mr. Tesh appraised land in the *Xcel I* and *TMPA* proceedings on behalf of BNSF. He has experience appraising commercial, industrial, residential and agricultural properties located throughout the United States, as well in the Caribbean, Canada, Mexico and Central America.

Mr. Tesh is a Counselor of Real Estate ("CRE") of the American Society of Real Estate Counselors, one of only 1,100 real estate experts in the world who have earned that designation. He has also served as an officer of various other real estate associations and is currently on the Advisory Council for Military Base Encroachment issues. He is certified to appraise real estate in many states, including Wyoming -- the state that LRR's right of way crosses.

Mr. Tesh applies the per-acre land value determined by WFA/Basin to the slightly modified acreage that BNSF's witnesses have determined must be acquired by the LRR. On that basis, Mr. Tesh concludes WFA/Basin would need to pay sellers in order to acquire the property necessary to build LRR $7,336,447[13] in 2004 dollars.[14]

a. Right-of-Way Acreage

WFA/Basin propose using on average 100-foot ROW widths for LRR and emphatically state that the LRR will not acquire any additional ROW.[15] BNSF's Engineering Consultants accepted this limitation, but calculated the additional costs for retaining walls that would be

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[13] BNSF Reply electronic workpaper "III F 1 LRR Land.xls," worksheet "Summary."

[14] In WFA/Basin's discussion of the cost of acquiring land for the LRR, all dollar amounts are in October 1, 2004 dollars.

[15] WFA/Basin Opening Nar. at III-F-3.

incurred in areas where 100 feet is patently inadequate. For purposes of land valuation, they advised Mr. Tesh that they accepted WFA/Basin's proposed ROW widths.

b. Yards

WFA/Basin propose that LRR would need to acquire 139.73 acres of land for yards at a cost of $261,317.[16] As discussed in detail above, BNSF capacity and operating witnesses, Mr. Wheeler and Mr. Mueller found that WFA/Basin's estimate of track miles for LRR was for the most part correct. BNSF Engineering Consultant, Ms. Gouger, increased the track miles only slightly to include the appropriate set-out tracks. BNSF Engineering Consultant Mr. Primm found that to accommodate certain facilities that WFA/Basin omitted or undersized, the Guernsey Yard needed to be expanded slightly. As described below, it would be necessary for LRR to acquire a total of 160.44 acres to accommodate the expanded Guernsey Yard for a total yard acreage of 179.05.[17] Mr. Tesh estimates that the cost of purchasing the land for the yards and facilities would be $2,897,467.[18]

c. Microwave Towers

WFA/Basin propose acquiring an additional 69 acres for $123,840 for microwave towers.[19] Ms. Gouger agrees with that assessment and therefore, BNSF accepts WFA/Basin's acreages for the microwave sites. BNSF also accepts WFA/Basin's assumption of the per-acre

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[16] WFA/Basin Opening Nar. at III-F-3-4; WFA/Basin Opening electronic workpaper Folder "III-F-1." This cost includes an assemblage factor for the 18.61 acres north of Bridger Junction.

[17] WFA/Basin erred in the acres that they develop in the III.F. section and what appears in their land costs. The total yard acreage should be 191.89 using WFA/Basin's Opening acres for South Logan (11.04 acres), Donkey Creek (20.41 acres), and the newly developed Guernsey (160.44 acres).

[18] BNSF Reply electronic workpaper "III F 1 LRR Land.xls," worksheet "Summary."

[19] WFA/Basin Opening electronic workpaper "LRR Land Costs.xls."

value of the microwave site land to be acquired. The ROW that LRR plans to use consists of agricultural land in a fairly remote part of the country that is not ordinarily of significant value. Any misstatement of the per-acre value of the land is not likely to have a significant impact on SAC costs.

d. WFA/Basin Undervalued Those Portions Of LRR That Were Recently Acquired

Mr. Brockman errs by understating the assemblage factor. Mr. Tesh notes that railroads usually pay a price above the market value for individual segments of land in order to assemble a rail corridor. Railroads often pay this premium because they need strategically located properties to create a contiguous corridor in order to construct rail lines. When valuing land that has a highest and best use as a railroad corridor, it is necessary to consider this premium.

The Board, like its predecessor the ICC, has acknowledged that where the incumbent incurred an expense relating to the acquisition of a rail corridor, the SARR should be assumed to incur that expense as well. Portions of the LRR ROW were purchased and assembled at market prices by BNSF or its predecessor in recent years and any assemblage premium was incurred by the incumbent for those portions of the LRR ROW. For the Orin Line section, which goes from Converse to Donkey Creek, the STB already concluded, based on detailed a review of evidence relating to the original acquisition of that property, that an assemblage factor of 6.65 is appropriate for that land based on the actual purchase price paid for the line as compared to the across-the-fence value.[20] The Board studied that matter closely in the *WTU* proceeding and made a definitive determination as to the appropriate assemblage factor and WFA/Basin provide no basis here to change that determination. Nonetheless, Mr. Brockman proposes applying an

[20] In *WTU*, 1 STB at 638 n. 144, the Board found that the purchase price of the Orin Line was $2,864,760. *See also Xcel I*, slip op. at 87-88.

assemblage factor of only 4.3 for the 155.3 miles north of Bridger Junction. Using this factor would result in a land value of $2,540,972. That is less than the purchase price for the Orin Line land in 1978.[21] If Mr. Brockman had used the appropriate assemblage factor of 6.65 the value of that portion of the line would have been $3.93 million using the land values he proposes. Thus, the value Mr. Brockman suggests is substantially below the land's accurate value.

In support of his low assemblage factor, Mr. Brockman reviews appraisal literature and pipeline land sales. (Mr. Brockman has no practical experience in railroad land acquisitions.) He contends that his 4.3 factor is consistent with that literature and those sales, which had assemblage factors ranging from 1.94 to 8.45.[22] Mr. Brockman's proposed assemblage factor is the mean of that range. While Mr. Brockman's review of the literature and application of averages might be useful in some other context where no real data exist, there is no reason to resort to a theoretical assemblage factor here and ignore a historic transaction that has already been evaluated and adjudicated by the Board. The Board has determined the actual assemblage factor that corresponds to this land based on the sales prices in that transaction. The Board determined that the actual market-derived 6.65 assemblage factor was appropriate for this land. There is no rational basis for second guessing that analysis here. Therefore, BNSF applies the 6.65 assemblage factor to Mr. Brockman's valuation to arrive at a value of $3.93 million.

e. WFA/Basin Undervalued the Guernsey Yard

Mr. Brockman values 121.12 acres for the Guernsey yard at $151,400. Ms. Gouger testifies that the actual acreage required for the Guernsey yard is 160.44 acres. Mr. Tesh valued the Guernsey, Wyoming yard in the *TMPA* proceeding. Mr. Tesh physically inspected and

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[21] *Id.,* 1 STB at 638 n. 144.

[22] WFA/Basin Opening Exh. III-F-2, p. 41 of 395 at 30.

appraised that yard. Using this analysis, Mr. Tesh valued the 160.44 acres[23] based on the size specifications of BNSF witnesses Primm and Gouger. Based only on a conversation with a broker, Mr. Brockman values that yard at $1,250 per acre, incredibly less than 3¢/square foot.[24] Based on the multiple uses he saw near the yard in Guernsey and multiple sales transactions he reviewed, Mr. Tesh valued that land at $17,000[25] per acre in *TMPA*. Based on the increase in real estate values that Guernsey has experienced since that time, Mr. Tesh believes that using his valuation from *TMPA* here on a pro-rata basis is conservative and should be substituted for Mr. Brockman's value. Any argument that the town of Guernsey is south of the mainline and the yard is north is nonsensical. The town influences the yard values and the town cannot extend to the north because the yard is there. Mr. Tesh's revaluation of the Guernsey yard is $2.73 million.

With respect to the Gurensey Yard, Mr. Tesh's valuation differs from Mr. Brockman's by more than one variable (*i.e.*, both the acreage and cost per acre). Therefore, in accordance with the STB's *General Procedures for Presenting Evidence in SAC Rate Cases*, slip op. at 6, BNSF sets forth the itemization of the differences between BNSF's and WFA/Basin's valuation attributable to each of those two variables in Table III.F.1-1 below.

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[23] BNSF Reply electronic workpaper "III F 1 LRR Land.xls," worksheet "Yards."

[24] WFA/Basin Opening Exh. III-F-2, page 29 of 395 at 23.

[25] BNSF Reply electronic workpaper "III F 1 LRR Land.xls," worksheet "Yards."

Table III.F.1-1
Comparison of Acreage and Unit Values
for Guernsey Yard

WFA/Basin[26]	
Acreage	121.12
Value	$151,400
Value/Acre	$1,250
BNSF[27]	
Acreage	160.44
Value	$2,727,480
Value/Acre	$17,000

f. Other -- Conclusion

Table III.F.1-2 consolidating and summarizing BNSF's property value conclusions is set forth below.

Table III.F.1-2
Comparison Of BNSF's Land Valuation And
Adjustments To WFA/Basin's Valuation

Land	WFA/Basin	BNSF	Difference
South of Bridger Jct. ROW	$653,554	$653,554	$0
North of Bridger Jct. ROW	$2,333,016	$3,608,036	$1,275,020
Yard-Guernsey	$151,400	$2,727,480	$2,576,080
Yard-Donkey Creek	$108,360	$167,580	$59,220
Yard-South Logan	$1,557	$2,407	$851
Yards-Total	$261,317	$2,897,467	$2,636,151
Microwave Tower Sites	$123,840	$177,420	$53,580
Grand Total	**$3,371,726**	**$7,336,477**	**$3,964,751**

26 WFA/Basin Opening electronic workpaper "LRR Land costs.xls."

27 BNSF Reply electronic workpaper "III F 1 LRR Land.xls," worksheet "Yards."

2. Roadbed Grading

a. Roadbed Preparation—Clearing, Grubbing, Foundation Conditioning and Undercutting

(1) Clearing and Grubbing

Clearing is the cutting of all trees, stumps, brush, shrubs and other vegetation at a level not more than six inches above ground, and the disposal of all cut material, other fallen branches and all surface litter. Grubbing is the removal and disposal of all stumps, roots and embedded logs, and all boulders and debris visible on the surface.

WFA/Basin developed costs for clearing and grubbing based upon the acres per track mile that were identified as having been cleared and/or grubbed when the rail lines being replicated by the LRR were originally constructed, as reported in the ICC Valuation Section "Engineering Reports." WFA/Basin increased the reported quantities slightly to account for the larger modern day roadbed section they specify for the LRR.

For the BNSF Orin Line (the Orin and Reno Subdivisions) and the Eagle Butte Jct. to Campbell (Campbell Subdivision) segments replicated by the LRR that were constructed more recently, WFA/Basin purport to use publicly available data to identify the clearing and grubbing quantities, but in fact included no costs for clearing and grubbing. WFA/Basin Opening Nar. at III-F-16. This is because the BNSF source documents referenced by WFA/Basin did not separately identify quantities for clearing and grubbing. But that does not mean that clearing and grubbing were not required on these line segments, or that no costs were incurred for them.

Clearing and grubbing were clearly required as part of the BNSF new line construction for the Orin Line. The Orin Line grading specifications stated that "all vegetation and debris within the limits of the excavation and embankment areas shall be cleared and grubbed" but that for measurement and payment "such work will be considered incidental to and included for payment under the contract unit price for 'Excavation.'"[28] Therefore, it was incumbent on the bidding contractor to determine the relevant quantities and include the expense for this activity in the excavation unit cost.

WFA/Basin, however, used the BNSF Shawnee to Walker Third Main project currently under construction as the source of their unit cost for excavation. Unlike the bid documents for the original Orin Line and Eagle Butte to Campbell segments, the Shawnee to Walker bid documents list clearing and grubbing as a separate bid item. Thus, the costs for clearing and grubbing are not included in the excavation cost that WFA/Basin selected from the Shawnee to Walker project. Therefore, additional costs for clearing and grubbing should be added to the costs for the Campbell, Orin and Reno subdivisions as a valid expense on the LRR.

To determine a quantity, BNSF Engineering Consultants used information provided for the Shawnee to Walker project. The Shawnee to Walker project is the construction of a third main track at 25-foot centers between MP103.4 and MP 117.6 on the Orin Subdivision and includes widening the roadbed by ten feet to adjust the track center on the two existing main lines from 15 feet to 25 feet. A 13-foot access road was also constructed, as shown in the schematic of the typical section for this project.[29] As of the invoice dated August 2004 (produced by BNSF in discovery),[30] 181 acres on the 14.2-mile construction project had been cleared and grubbed, which yields an average width of 105 feet. This includes the 62 feet of

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[28] Sections 3.2 through 3.2-5 of the BNSF Gillette North construction specifications (which include the Eagle Butte to Campbell segment) state that clearing and grubbing are required, but should not be separately itemized in the billing. Instead, they should be included in the cost for excavation. BNSF Reply electronic workpaper "Clearing and Grubbing.pdf."

[29] The schematic was produced in discovery as document BNSF/LR 22567 and is included in BNSF Reply electronic workpaper "Clearing and Grubbing.pdf."

[30] WFA/Basin Opening electronic workpaper "walker to shawnee unit cost.pdf" included in BNSF Reply electronic workpaper "Clearing and Grubbing.pdf."

subgrade surface (10' widening + 25' third main track center + 14' shoulder + 13' access road) and another 43 feet which represents the width of one side of the track section, as the project involves widening on only one side of the existing track. The 43-foot side width is the area required to accommodate the side slope and work zone. By way of comparison, adding two side widths to a single main line with a 24-foot roadbed width such as WFA/Basin construct for the LRR would yield a cleared and grubbed width of 110 feet (43' + 24' + 43').

The 110 feet calculated above does not take into account any of the additional width for second or third main tracks at 25-foot centers, which demonstrates the folly of WFA/Basin's insistence on squeezing the entire LRR construction into a 100-foot ROW. WFA/Basin have emphatically stated that "[t]he LRR will not purchase any additional land for its ROW, notwithstanding whatever additional property BNSF acquired when it built the Orin Subdivision or any other segments being replicated by the LRR." WFA/Basin Opening Nar. at III-F-3.[31] Therefore, BNSF Engineering Consultants have not added any additional ROW, but clear and grub the entire 100-foot ROW on the newer segments. This is conservative as it accounts for less area than what is realistically required.

BNSF's unit cost for clearing and grubbing the Campbell, Orin and Reno Subdivisions is ${ } per acre based on the Shawnee to Walker bid cost shown on WFA/Basin's electronic workpaper "walker to shawnee unit costs.pdf."

For the other line segments, WFA/Basin developed two separate costs for clearing and a single cost for grubbing from the RS Means Handbook for 2005. For the acreage identified in

[31] WFA/Basin's absolute limitation of a 100-foot ROW width is foolish because it does not provide the space needed to construct a railroad with multiple tracks at 25-foot centers. In order to squeeze everything into that limited space, the slope would have to be adjusted in a manner that would require the LRR to construct retaining walls, as discussed more fully in Section III.F.2.f.

the Engineering Reports as requiring both clearing and grubbing, WFA/Basin used the RS Means clearing cost of $4,623.85 per acre for medium cutting and chipping of trees to 12 inches in diameter and added to that a grubbing cost of $2,965.30 per acre. For cleared acres for which the documents do not show corresponding reported quantities for grubbing, WFA/Basin applied a cost of $221.14 per acre for the clearing of medium brush with a dozer and brush rake. WFA/Basin Opening Nar. at III-F17-18. BNSF Engineering Consultants accept the unit costs WFA/Basin developed from RS Means.

The difference between the unit costs used by WFA/Basin for the ICC sections and the unit cost in the Shawnee to Walker project used by BNSF Engineering Consultants for the more recently constructed segments is due to the area of activity to which the costs are applied. The Shawnee to Walker unit cost covers the entire area of construction, whereas the RS Means cost is applied only to the specific areas that require intense clearing and grubbing (and thus higher costs per acre). For example, the Shawnee to Walker bid cost is applied to 181 acres on a 14.2-mile project, whereas the Means costs are applied to 165.5 acres on a 218-mile project. BNSF bids its projects this way to allow the contractor to determine the amount of work required to clear and grub the entire disturbed area, rather than attempting to identify in advance the specific acres requiring such work. Covering the entire disturbed area precludes any owner-contractor conflicts over acres that were not covered in the original bid.

(2) Stripping

"Stripping" involves the removal of surface organic material that will create a weak zone in the final roadbed. According to AREMA, areas of cuts and fills should be stripped of all vegetation, sod, topsoil and unsuitable material. This requirement is consistent with BNSF current construction practices, which typically require the contractor to remove the top six inches of ground along the proposed roadbed before any excavation or embankment work can commence.

WFA/Basin did not include any costs for this activity in their construction costs for the LRR because they claim that "BNSF has not shown that stripping is required on the Orin Line" and because "the top six inches would be removed during excavation." WFA/Basin Opening Nar. at III-F-19. The Shawnee to Walker documents show that this activity is indeed needed. The Shawnee to Walker project has separate line items for excavation and stripping (topsoil removal).

In past cases, the parties have used costs from RS Means for excavation on all segments of the SARR. Those unit costs did not include stripping costs, which RS Means accounts for as a separate item. However, in this case, WFA/Basin are using an excavation unit cost from BNSF's Shawnee to Walker project rather than from Means. They are also using the quantities for the more recent line segments (which compromise most of the LRR) from the actual Orin Line quantities.[32] The contract documents for the Orin Line specify that the additional quantities for topsoil removal (stripping) will be paid at the excavation cost; however, the plans for the Orin Line also specifically note that the topsoil removal quantity was included in the total earthwork quantity. Since the Orin Line earthwork quantities are being used for all of the newer line segments, the quantities for stripping are already in the earthwork quantities for the LRR and therefore no additional quantities or costs for stripping are added.

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[32] BNSF Reply electronic workpapers "Cordero to Reno Plans.pdf" and "Reno to Bill Plans.pdf."

(3) Foundation Conditioning

WFA/Basin made no mention of foundation conditioning in their Opening Narrative and have included no costs for this activity, despite the fact that the Shawnee to Walker project upon which WFA/Basin rely for other grading unit costs (such as excavation, embankment, topsoil, seeding and water for compaction) includes foundation conditioning as a bid item. The invoice provided by BNSF in discovery shows the amount of foundation work that had been completed as of August 2004.[33]

The main purpose of foundation conditioning (or overexcavation) is to provide a subgrade that is properly compacted to the embankment standard for a certain depth. The conditioning occurs on all cut sections and on a portion of the embankments that are less than the conditioning depth. The depth that the Shawnee to Walker project uses for conditioning is 18 inches. Overexcavation is different from removal of unsuitable material (undercutting) in that the material removed in overexcavation is not necessarily unsuitable as fill material – it is just not compacted to standard density and therefore has to be removed and replaced with other material, as shown in BNSF Reply electronic workpaper "Fnd Conditioning.pdf."

The Shawnee to Walker Project Manual, provided to and used by WFA/Basin for other purposes, includes a specification for foundation conditioning, or what this project refers to as "overexcavation."[34] This activity is common on BNSF construction projects and was used in the original Orin construction.

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[33] WFA/Basin Opening electronic workpaper "walker to shawnee unit cost.pdf" included in BNSF Reply electronic workpaper "Fnd Conditioning.pdf."

[34] BNSF/LR 22014 in BNSF Reply electronic workpaper "Fnd Conditioning.pdf.

The original Orin Line (Reno to Bill) construction specifications state under the heading "Special Treatment Subgrades and Embankment Foundations"[35] that this activity will be paid for at the contract unit price for excavation. Although the actual amount of overexcavation on the Orin Line has not been available in the past, an estimate can be derived from the Shawnee to Walker bid documents. BNSF Engineering Consultants used the same portion of overexcavation for embankment/excavation compared to the amount of embankment/excavation that was actually completed on the Shawnee to Walker project as of the August 2004 invoice submitted by the contractor.

As of August 2004, there were 37,532 CY of "Overexcavation – Emb" compared to 556,220 CY of embankment, which is 6.8 percent; and there were 83,950 CY of "Overexcavation – Exc" compared to 878,651 CY of excavation, which is 9.5 percent. Since the original Orin quantities do not specify the amount of embankment, BNSF used the 70 percent of excavation assumption used by WFA/Basin and applied the Shawnee to Walker percentage to compute the amount of foundation conditioning for embankment areas.

The unit costs for foundation conditioning for excavation ({ }) and for embankment ({ }) are taken from the Shawnee to Walker project costs.

(4) Undercutting

Excavation of unsuitable material, or undercutting, is required when material at the base of an embankment is unacceptable as a base for fill. This material is typically wasted, because it is also unacceptable as embankment material elsewhere.

WFA/Basin did not include any costs for undercutting, on the ground that the STB has rejected such costs in the past. WFA/Basin Opening Nar. at III-F-19. However, the Shawnee to

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[35] BNSF Reply electronic workpaper "Fnd Conditioning.pdf."

Walker project documents show that undercutting was necessary and that it was included as a separate bid item.[36] The invoice, provided in discovery by BNSF, shows the quantity of undercutting that had been completed as of August 2004.

The Reno to Bill and Gillette North specifications for the original Orin Line construction state under the heading "Removal of Unsuitable Material" that the material will be *removed* at the contract unit price for excavation and *replaced* with other material at the contract unit price for excavation.[37] In effect, for the original Orin Line, removing and replacing this material was paid for at twice the unit price of excavation (the original construction did not have a separate bid item for embankment).

The specifications in the original Orin Line construction documents for undercutting together with the inclusion of undercutting as a separate bid item in the Shawnee to Walker project are clear evidence that undercutting was and is required on the LRR lines. Although the actual amount of undercutting on the Orin Line has not been available in the past, the quantities in the Shawnee to Walker project can be used to extrapolate the undercutting quantities for the entire line. To determine quantities for the LRR, BNSF Engineering Consultants used the same portion of excavation of unsuitable material compared to the amount of embankment that was actually completed on the Shawnee to Walker project as of the August 2004 invoice submitted by the contractor for payment.

As of August 2004, there were 7,676.5 CY of excavation of unsuitable material compared to 556,220 CY of embankment. This is approximately 1.4 percent. Since the original Orin quantities do not specify the amount of embankment, BNSF Engineering Consultants again

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[36] WFA/Basin Opening electronic workpaper "walker to shawnee unit costs.pdf" included in BNSF Reply electronic workpaper "Undercutting.pdf."

[37] BNSF Reply electronic workpaper "Undercutting.pdf."

relied on the WFA/Basin assumption that 70 percent of excavation is used for embankment and applied the Shawnee to Walker percentage to compute the quantity for undercutting.

The unit price of { } from the Shawnee to Walker invoice was applied to the above quantities.

Details of BNSF's restatement of clearing, grubbing, foundation conditioning and undercutting quantities and costs are included in BNSF Reply electronic workpaper "III F 2 LRR Grading.xls."

b. Earthwork

(1) Segments For Which Engineering Reports Exist

In developing earthwork quantities for the LRR, WFA/Basin relied on the information contained in the ICC Engineering Reports (ICC Bureau of Valuation Form No. 561) for those line segments that were in existence when the ICC conducted its rail line valuation studies circa 1915. These documents contain estimates of actual earthwork quantities for each valuation section of the BNSF predecessor railroads by type of material – common, loose rock and solid rock – based on construction standards typical of that period. WFA/Basin adjusted the reported earthwork quantities to reflect more modern railroad roadbed construction specifications for the LRR and applied a pro-rata portion of the adjusted quantities to the portions of each BNSF valuation section used by the LRR. WFA/Basin also adjusted the Engineering Report quantities to reflect 25-foot track centers. WFA/Basin Opening Nar. at III-F-24.

BNSF Engineering Consultants have adopted much of WFA/Basin's approach in their restatement of the LRR earthwork quantities for these segments, including the use of the Engineering Reports and the adjustments for track centers.

(2) Segments For Which There Are No Engineering Reports

There are no Engineering Reports for three segments of the LRR that were constructed subsequent to the completion of the ICC valuation studies: (a) Donkey Creek to Orin Jct., (b) Eagle Butte Jct. to Campbell, and (c) Reno to Black Thunder. For these segments, WFA/Basin developed earthwork quantities from BNSF's actual construction experience. WFA/Basin developed earthwork quantities for Donkey Creek to Orin Jct. and Reno to Black Thunder Jct. based on the testimony of BNRR witness Jerry Masters ("Masters' Testimony") provided in the *IPS* case in ICC Finance Docket No. 37021.[38] WFA/Basin Opening Nar. at III-F-25 to 26. For the Eagle Butte to Campbell segment, WFA/Basin used information for that segment that BNSF provided in discovery, using the same format as for the information provided by Mr. Masters for the Orin Line data. *Id.* at III-F-25.

For all three of these line segments, WFA/Basin assumed the LRR would be constructed with a 24-foot roadbed, despite the fact that these segments were originally constructed with 28-foot roadbed widths. WFA/Basin therefore reduced the actual Orin Line and Campbell quantities to reflect the narrower roadbed widths.

BNSF Engineering Consultants take issue with WFA/Basin's roadbed widths and with WFA/Basin's failure to make the appropriate adjustments for track centers on these line segments.

WFA/Basin constructed the entire LRR to a width of 24 feet, neglecting the fact that BNSF has constructed the Orin, Reno and Campbell Subdivisions with a 28-foot roadbed width. WFA/Basin justify their use of a 24-foot roadbed on the ground that "[t]his roadbed is similar to that used by BNSF on its high density, single track segments on the Canyon Subdivision."

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[38] *Iowa Pub. Serv. Co. v. Burlington North R.R. Co.,* ICC Docket No. 37021.

WFA/Basin Opening Nar. at III-F-23. This is an example of how WFA/Basin build a *least cost* -- but *inefficient* -- railroad. Rather than building a railroad based on the construction standards proven to be efficient for heavy coal traffic, they replicate standards of construction used more than 30 years ago and which, even in 1979, BNSF had already upgraded on its new construction. BNSF and UP have continued to upgrade those standards for the construction of high density lines carrying heavy axle loading traffic such as unit coal trains. In fact, the Union Pacific's current standard roadbed width for high density lines is 30 feet.[39]

In 1979, the first year that the Orin Subdivision was in operation, BNSF originated 80.2 million tons of coal. By 1980, that volume increased to 100.3 million tons.[40] The Orin Subdivision on the LRR is expected to carry in excess of this amount of coal in the peak year. CN&W did not take its first coal train from the Powder River Basin until 1984, so the earlier BNSF coal tonnages were the only tonnages over the new line. Yet, even then the line was built to 28-foot roadbed widths, not 24-foot. It is ridiculous to assume that a new modern railroad would replicate the Orin Line using standards of construction that were lower than those used on the Orin Line when it was originally constructed.

The 24-foot roadbed width on the Canyon Subdivision was built before the Orin Line was constructed and before the development of heavy coal traffic. That roadbed width has not proven to be adequate to handle unit coal trains. In fact, more recent construction projects completed along the Canyon Subdivision, including the Guernsey Tunnel Daylighting project and the Stokes Siding, have been constructed with 28-foot roadbeds. The fact that there are older lines in existence today that now carry coal, but originally were not built to carry coal or to the

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[39] BNSF Reply electronic workpaper "24' Roadbed Width.pdf."

[40] BNSF Reply electronic workpaper "24' Roadbed Width.pdf."

higher standards required today for coal traffic, does not justify a return to those standards in the construction of a modern coal-hauling railroad today. The LRR should be constructed to the standards required for the type of traffic it expects to carry, and not to the standards used on lines built before the development of unit train coal traffic.

In their restatement of earthwork quantities, BNSF Engineering Consultants have used a 28-foot roadbed width on the Orin, Reno and Campbell Subdivisions, consistent with modern standards for those line segments.

Modern day standards also require 25-foot track center spacing, as WFA/Basin acknowledged in their Opening Narrative at III-F-24. However, WFA/Basin did not adjust the Orin or Campbell project quantities that they used for the LRR to account for the increase to 25-foot track centers. The original construction of those lines was based on 15-foot centers, as shown in the original plans[41] and the Campbell double track is still at 15-foot track centers. But for the same reasons stated above with respect to roadbed width, it is illogical to construct a modern railroad to antiquated standards that the railroads are in the process of changing -- especially when all of the other segments of the LRR will be constructed to the new standard. Accordingly, BNSF Engineering Consultants have adjusted the earthwork quantities for the more recently constructed line segments, which were originally constructed at 15-foot track centers, to reflect the 25-foot track centers.

(3) <u>Access Roads</u>

WFA/Basin did not construct any access roads adjacent to the tracks along the LRR. The omission of access roads makes no sense considering the number of trains and the cycle times that WFA/Basin project for the LRR. During a previous field trip, BNSF Engineering

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[41] BNSF Reply electronic workpaper "24' Roadbed Width.pdf."

Consultants noted that over 180 miles of access roads currently exist on the BNSF lines being replicated by the LRR.[42]

BNSF's current standard is to construct an access road on the outer side of one track in double track stretches and to construct an access road on the outer sides of tracks 1 and 3 in triple track sections. Access roads on both sides of these tracks are necessary on the high tonnage triple track segments because access to multiple tracks while under traffic would be impossible without such roads, given the number of trains traveling on the existing BNSF. Since WFA/Basin have constructed the LRR with mostly double track on the Orin Line, with only a short triple track section on the north end, BNSF Engineering Consultants conservatively construct access roads only on the outer side of one track on line segments where BNSF currently has access roads. This reduces the 180 miles of existing access roads to 140 miles on the LRR as shown in BNSF's electronic file "III F 2 Access Roads.xls," worksheet "LRR."[43]

The original Orin Line construction plans that were made available to WFA/Basin consultants in Kansas City show that seven-foot access roads were constructed adjacent to the rail subgrade in designated fill areas as described on the plan's typical sections. Therefore, the earthwork quantities that WFA/Basin used from the Masters' testimony already include some quantities associated with the construction of adjacent access roads. A compilation of the distances of the project route that occurred in fill from the original plan, profiles and typical sections shows that there are approximately 31.44 miles of seven-foot access roads along the 66.48 total project miles covered by these plans.[44] Thus, for 47% of the Orin Line segments, the

[42] BNSF Reply electronic workpaper "Access Roads.pdf."

[43] BNSF Reply electronic workpaper "III F 2 Access Roads.xls" worksheet "LRR."

[44] BNSF Reply electronic workpaper "III F 2 Access Roads.xls."

quantities in the Masters' testimony include earthwork for seven-foot access roads. The Gillette North documents used to develop quantities for the Eagle Butte to Campbell line segment do not provide access road data. However, since the adjusted grading quantities for the original Orin line are applied to the entire Orin and Reno Subdivisions, BNSF Engineering Consultants will conservatively apply the 47% to the Campbell Subdivision as well. Applying this percentage to the Campbell (9.50 miles), Orin (127.28 miles) and Reno (5.76 miles) Subdivisions results in 67.41 miles of seven-foot access roads for which the earthwork is already included in WFA/Basin's Opening Evidence earthwork quantities.

Because seven-foot access roads proved inadequate, BNSF subsequently widened them to 13 feet. Since the earthwork quantities for the newer line segments already include quantities for 67.41 miles of seven-foot access roads, on Reply, BNSF Engineering Consultants added only quantities for six additional feet of earthwork for these miles. For access roads on the remaining areas where BNSF has access roads, 13 feet of earthwork were added.[45]

(4) Yards and Interchange Tracks

WFA/Basin assume the LRR will have three yards located at Guernsey, Donkey Creek and South Logan. For grading purposes, they divided Guernsey into two sections. The section WFA/Basin designate as Guernsey Yard West is the yard that was originally built and for which the quantities are captured in the ICC Engineering Reports. The portion designated as Guernsey Yard East is the extension that BNSF built in 1970, but enlarged for the LRR. WFA/Basin Opening Nar. at III-F-27. The LRR will also have five locations to interchange traffic with the

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[45] BNSF Reply electronic workpaper "III F 2 LRR Grading.xls," worksheet "IIIF_10 CY Grad."

residual BNSF -- Campbell, Donkey Creek, Orin Jct., Guernsey, and Moba Jct., Wyoming. WFA/Basin Opening Nar. at III-B-2.

BNSF has accepted the LRR proposed yard locations at Donkey Creek, Guernsey, and South Logan, as well as the interchange track locations at Campbell, Orin Jct. and Moba Jct., except for minor adjustments to the mechanical tracks at the East Guernsey Yard.

(a) Donkey Creek Yard, Guernsey Yard West and Interchange Tracks at Campbell, Orin Jct. and Moba Jct.

WFA/Basin based the grading requirements for the Donkey Creek and Guernsey West yards on an assumed fill height of one foot. The interchange tracks were built based on the assumptions for the mainline track for those sections. BNSF Engineering Consultants have inspected these two yard locations and the proposed interchange locations at Campbell, Orin Jct. and Moba Jct. and found that no special circumstances related to earthwork are present at any of these locations. As a result, BNSF Engineering Consultants accept WFA/Basin's assumptions for those LRR locations.

(b) Guernsey Yard East

In developing the earthwork quantities for Guernsey Yard East, WFA/Basin acknowledged that the one-foot fill assumption was not appropriate. The LRR's yard at this location is larger than BNSF's present Guernsey Yard East and the topography surrounding the yard is not flat. Thus, WFA/Basin calculated grading quantities for this yard using 1974 USGS 7.5 quadrangle maps for the area and Eagle Point 2003 civil engineering software. The total quantities were then allocated to the three types of excavation (common, loose rock and solid rock) based on the distribution of excavated materials for the valuation section containing Guernsey quantities. WFA/Basin Opening Nar. at III-F-31.

In response to a request for workpapers, WFA/Basin provided the design files that their consultants used to run the Eagle Point program. BNSF Engineering Consultants then asked the engineering firm of Felsburg, Holt & Ullevig to recreate the existing and proposed ground contours and to rerun the software to develop the quantities.[46] Based on the results, BNSF Engineering Consultants agree that the quantity of earthwork that WFA/Basin included for the East Guernsey Yard is representative of the design files provided to BNSF.

However, BNSF Engineering Consultants take issue with the typical section used by WFA/Basin in determining the quantities. There are three major flaws in the typical section. First, WFA/Basin did not construct any ditches in the cut sections of the yard, thus allowing the adjacent cut slope drainage to saturate the subgrade. Second, WFA/Basin constructed only a ten foot shoulder on the outer most yard track, which is inconsistent even with their own standard for typical yard track shown in their hard copy workpaper 05851.[47] Third, in their adjustments to the contours, WFA/Basin *raised* the subgrade nine inches *above* the profile they created from the USGS quadrangle maps. Each of these errors is discussed below.

Drainage Ditch. Even though WFA/Basin construct a 24-inch storm sewer collector between the tracks, that will not capture the water that flows from the adjacent cut slope onto the subgrade. Since the storm sewer system that WFA/Basin installed does not extend to the outside of the last track, this water would have to travel past the first yard track into the storm sewer. Because WFA/Basin designed the yard subgrade with a 2 percent slope, on one side of the yard, the water would just sit in the 10-foot shoulder of the outermost track, inevitably saturating the subgrade. BNSF currently has a ditch adjacent to the East Guernsey Yard to avoid this problem.

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[46] *See* BNSF Reply electronic workpapers in Subfolder "III - F - 2 Guernsey Yard."

[47] WFA/Basin Opening Workpapers Vol. 10, p. 05851.

Therefore, BNSF Engineering Consultants have added the two-foot flat bottom ditch (accepted by the Board in other cases) to the cut sections throughout the yard.

Ten-Foot Shoulder. It is not clear why WFA/Basin did not construct the standard twelve-foot shoulder (the distance from the centerline of the track to the edge of the subgrade) for the outermost yard track according to their own standard yard section shown on their workpaper 05851.[48] The combination of a smaller shoulder and no ditch will result in major drainage problems. Therefore, BNSF Engineering Consultants have constructed a 12-foot shoulder on the outermost yard track.

Adjustments to Contours. The existing ground contour that WFA/Basin developed from digitizing the USGS quadrangle maps is acceptable. Typically, the elevation that results in the area of the roadbed centerline is that of the top of the tie. This assumption is based on the likelihood that random shots will miss the top of the rail. Therefore, the profile that WFA/Basin developed for the yard is acceptable as representing the top of the tie. WFA/Basin inexplicably raised the profile nine inches when running (inputting) their cross sections, which in effect develops the profile as of the top of rail rather than as of the subgrade. In order to get accurate grading quantities, the subgrade elevation should be used, which would mean that the top of the tie profile should be lowered 18 inches (6" tie + 6" ballast + 6" subballast). BNSF Engineering Consultants have accepted the profile developed by WFA/Basin but lowered the subgrade 18 inches to determine the accurate grading quantities, as shown in the typical section.[49]

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[48] *Id.*

[49] *See* BNSF Reply electronic workpapers in Subfolder "Guernsey Yard" workpaper "Yard Cross Section.pdf."

In addition to these errors, WFA/Basin also made several errors in constructing the wye tracks in the yard. As shown in the BNSF Engineering Consultants' track cross sections,[50] when combining the major yard grading with the wye tracks, there is a difference in elevation at the tie in points. Also, the typical section that WFA/Basin used for the wye tracks consists of a 16-foot subgrade crowned with five percent slopes, which is again inconsistent with WFA/Basin's yard track standard. BNSF Engineering Consultants have redesigned the wye track to tie in correctly with the adjacent yard grading as well as using the correct section of 24-foot roadbed with ditches in the cut sections.

The restated earthwork based on WFA/Basin's Opening yard design for East Guernsey is 2,754,274 CY of excavation, an increase of approximately 300,000 CY.

WFA/Basin constructed roadways in the East Guernsey Yard, but did not allow for a roadway on the outside of the yard as BNSF has today. The photographs in WFA/Basin's workpapers 05398 to 05404[51] clearly depict the access road surrounding the existing East Guernsey Yard. In addition to widening the shoulder of the outermost track to include the 12-foot shoulder as discussed above, BNSF Engineering Consultants added a 13-foot access road. Also, the operating experts have adjusted the mechanical tracks around the locomotive shop requiring a slight adjustment to the northern most track. With the addition of the earthwork for the access road and mechanical track adjustments (92,000 CY), the total restated earthwork quantity for the East Guernsey Yard is 2,846,497 CY.

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[50] *See* BNSF Reply electronic workpapers in Subfolder "Guernsey Yard" workpaper "Yard Wye Cross Section.pdf."

[51] WFA/Basin Opening Workpaper Vol. 9, pp. 05398 to 05404; *see* BNSF Reply electronic workpapers in Subfolder "Guernsey Yard" file "East Yard Photos.pdf."

(c) South Logan Yard

BNSF does not have a yard at South Logan. Therefore, WFA/Basin based the earthwork quantity for this yard on the same per-mile quantities for side track that they used for main line segments in this territory. WFA/Basin Opening Nar. at III-F-30. However, WFA/Basin incorrectly used the quantities based on 15-foot track centers, whereas the specifications for that mainline called for 25-foot track centers and WFA/Basin designed the yard with one track at 14 and the other at 37.5-foot centers, which averages 25.75 feet.[52]. BNSF Engineering Consultants have corrected that error.

Table III.F.2-1 compares the yard earthwork quantities assumed by WFA/Basin with the yard earthwork quantities included by BNSF in its restatement.

Table III.F.2-1
Comparison of WFA/Basin and BNSF Earthwork Quantities

Yard Location	WFA/Basin	BNSF
Donkey Creek	55,118 CY	55,118 CY
Guernsey West	8,332 CY	8,332 CY
Guernsey East	2,455,923 CY	2,846,497 CY
South Logan	121,918 CY	293,197 CY

Source: BNSF Reply electronic workpaper "III F 2 LRR Grading.xls;" WFA/Basin Opening electronic workpaper "LRR GRADING.xls."

(5) Tunnel #2 Open Cut Quantities

The original Tunnel #2 on the Canyon Subdivision between Bridger Jct. and Guernsey was daylighted by BNSF in 1998. WFA/Basin chose to construct a large open cut, rather than a tunnel, and calculated the earthwork quantities on that basis. WFA/Basin used the final 1998 invoice for the grading contract from the actual Guernsey Tunnel Daylighting project to obtain the actual quantities and costs for daylighting the tunnel. They indexed the cost to 4Q2004. BNSF Engineering Consultants agree with the earthwork quantities and the costs from the

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[52] WFA/Basin Opening electronic workpaper "logan yard.dwg."

invoice that were included in WFA/Basin's evidence, although with a change in the historical index used. To be consistent with the historical indexing of the other LRR construction costs, RS Means historical index was used.

However, there were additional costs for materials supplied by BNSF that are not accounted for in the contractor's invoice, especially materials for the overpass bridge. This material cost BNSF ${ }.[53] In addition, because the tunnel is located within a State Park, BNSF was required to obtain a permit from the Wyoming Division of State Parks to daylight the tunnel and had to pay ${ } for the permit. The actual permit was in the files provided to WFA/Basin for review in discovery.[54]

BNSF has included these additional costs in its restatement of the Guernsey Tunnel Daylighting costs.

(6) Unit Costs

BNSF produced in discovery a substantial amount of information on BNSF recent construction projects for WFA/Basin's review and use. WFA/Basin selected their unit costs for common excavation and embankment from that information. WFA/Basin continue to use RS Means costs to develop their unit costs for loose rock and solid rock excavation.

(a) Common Excavation

WFA/Basin selected unit costs for common excavation and embankment from the winning bid for the Shawnee to Walker Third Main project on the Orin Subdivision. WFA/Basin combined the excavation and embankment unit costs and applied the total to the common earthwork quantities. BNSF Engineering Consultants accept WFA/Basin's unit cost, but as

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[53] BNSF Reply electronic workpaper "III F 2 Guernsey Tunnel Steel.xls."

[54] BNSF Reply electronic workpaper "Guernsey Tunnel Permit.pdf."

noted in previous sections have included unit costs from the Shawnee to Walker project for other roadbed activities that WFA/Basin intentionally omitted.

BNSF Engineering Consultants have applied the Shawnee to Walker unit cost to their restated total common earthwork quantities.

(b) Loose Rock Excavation

WFA/Basin built their per cubic yard unit cost for excavating loose rock from the Means Handbook. WFA/Basin used 300 HP dozers for ripping medium hard rock and shale, a dozer for pushing the ripped rock into piles, a 3 CY shovel for loading the loose rock into the truck, and a 42 CY off-highway hauler to transport it to either embankment or waste sites. Compaction was based on a combination of sheepsfoot and vibratory roller and was added to the embankment portion of the unit cost while at the waste sites. WFA/Basin also used a dozer to spread the material.[55] BNSF has reviewed WFA/Basin's equipment selections and has accepted all but the 3 CY shovel. WFA/Basin's equipment selections and unit costs are shown in the table below.

Table III.F.2-2
WFA/Basin's Development of Loose Rock Excavation

Means Unit	Embankment	Waste	Weighted
Ripping medium hard rock, 300 HP dozer, ideal conditions	$3.31	$3.31	$3.31
Ripping Shale, soft, 300 HP dozer, ideal conditions	$1.33	$1.33	$1.33
Avg. Ripping	$2.32	$2.32	$2.32
Dozing ripped material, 410 HP dozer, 100-ft haul	$1.36	$1.36	$1.36
Shovel, capacity 3 CY	$1.08	$1.08	$1.08
Markup for loading onto trucks 15%	$0.16	$0.16	$0.16
Off Highway hauler 42 CY rear bottom dump ½ mile round trip	$1.78	$1.78	$1.78

[55] WFA/Basin Opening Nar. at III-F-39 and Opening electronic workpaper "LRR GRADING.xls," worksheet "IIIF Unit Costs."

Means Unit	Embankment	Waste	Weighted
Spread dumped material by dozer-no compaction	$1.60	$1.60	$1.60
Avg. Compacting	$0.82		$0.57
TOTAL	**$9.11**	**$8.29**	
Embank./Waste Split	70%	30%	
Weighted Cost			**$8.86**

Source: WFA/Basin Opening electronic workpaper "LRR GRADING.xls," worksheet "IIIF Unit Costs."

WFA/Basin stated in their Opening Narrative that "most of the rock formations that occur through the area of the LRR's construction consist of striated rock, which is layered and therefore rippable." WFA/Basin Opening Nar. at IIII-F-39. BNSF agrees that rock that is apportioned to loose rock in the ICC Engineering Reports is rippable, and also agrees with WFA/Basin's acknowledgement that rippable rock means more than just trap rock and soft shale. WFA/Basin developed an average unit cost for ripping based on two RS Means unit costs, one for ripping medium hard rock and one for ripping soft shale. BNSF accepts the use of the average of these two unit costs. BNSF also agrees with the selection of a 410 HP dozer to move the ripped material into piles for efficient loading into the off-highway haulers, as well as WFA/Basin's use of a dozer to spread the dumped materials. Finally, BNSF accepts the use of a unit cost for compaction based on the combination of a sheepsfoot roller and a vibratory roller. These unit costs from RS Means are set out in WFA/Basin's electronic workpaper "III F LRR Grading.xls," worksheet "IIIF Unit Costs." The only equipment selection with which BNSF disagrees is WFA/Basin's selection of a 3 CY *shovel.*

Once the rock has been ripped loose, it must be gathered into piles suitable for loading into trucks. WFA/Basin selected the Means unit cost for a 3 CY shovel outfitted on a 75-ton crawler crane to load "common earth piled."[56] WFA/Basin provided no support for its selection of a 3 CY shovel. BNSF Engineering Consultants reject WFA/Basin's unsupported selection of a 3 CY power shovel and instead develop the cost of excavating loose rock and loading the materials into trucks based on the Means cost for a 3 CY *hydraulic excavator*. The Earthmover Encyclopedia describes the hydraulic excavator as follows:

> With the possible exception of the bulldozer, the hydraulic excavator is probably the most familiar of all earthmoving machines. Hydraulic excavators can be seen working on every kind of construction job from road maintenance, trenching, and foundation work to mass excavation on major industrial sites, as well as in quarries and surface mining operations. Their sizes range from the smallest "toys," weighing less than 2 tons, to some of the largest excavators being produced today. They are made by hundreds of manufacturers in every industrialized country around the world. Thousands of new machines are produced each month.[57]

In past proceedings, based on misleading statements by complaining shippers, the Board has dismissed the use of hydraulic excavators as trenching tools unsuitable for roadbed excavation. In fact, the hydraulic excavators cover a wider spectrum and are thus more flexible (and feasible) than the power shovel selected by WFA/Basin. According to manufacturer specifications, hydraulic excavators have a maximum digging height that is higher than a comparably sized power shovel and can dig to a depth far lower than a 3 CY power shovel.[58]

In their restatement, BNSF Engineering Consultants use the RS Means cost for a 3 CY hydraulic excavator in place of WFA/Basin's power 3 CY in developing their loose rock excavation unit cost.

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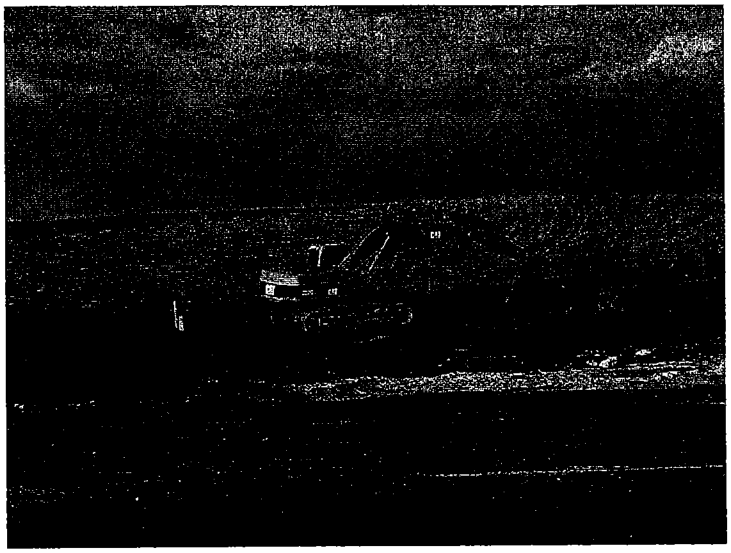
[56] BNSF Reply electronic workpaper "Loose Rock.pdf."

[57] BNSF Reply electronic workpaper "Loose Rock.pdf."

[58] BNSF Reply electronic workpaper "Loose Rock.pdf."



Hydraulic Excavator

BNSF agrees with WFA/Basin's inclusion of an additive of 15 percent for loading excavated materials onto trucks, a requirement that is clearly set forth in Means.

In determining the cost of hauling the excavated loose rock materials for embankment purposes along the LRR roadbed or to a waste pit, WFA/Basin selected an off-highway hauler with 42 CY capacity. Although it will be difficult for this equipment to stay within the confines of a 100-foot right of way, BNSF Engineering Consultants accept this equipment and cost.

Once the excavated materials have been hauled for placement in embankment or dumped as waste, the dumped material must be spread and shaped by a bulldozer. WFA/Basin recognized that both the material dumped for embankment and the material dumped for waste must be spread by a bulldozer. BNSF accepts WFA/Basin's unit cost for spreading.

The table below summarizes the loose rock excavation costs developed by BNSF.

Table III.F.2-3
BNSF's Development of Loose Rock Excavation

Means Unit	Embankment	Waste	Weighted
Ripping medium hard rock, 300 HP dozer, ideal conditions	$3.31	$3.31	$3.1
Ripping Shale, soft, 300 HP dozer, ideal conditions	$1.33	$1.33	$1.33
Avg. Ripping	$2.32	$2.32	$2.32
Dozing ripped material, 410 HP dozer, 100-ft haul	$1.36	$1.36	$1.36
Hydraulic Excavator, capacity 3 CY	$2.35	$2.35	$2.35
Markup for loading onto trucks 15%	$0.35	$0.35	$0.35
Off Highway hauler 42 CY rear bottom dump ½ mile round trip	$1.78	$1.78	$1.78
Spread dumped material by dozer-no compaction	$1.60	$1.60	$1.60
Avg. Compacting	$0.82		$0.57
TOTAL	**$11.62**	**$10.80**	
Embank./Waste Split	70%	30%	
Weighted Cost			**$10.33**

Source: BNSF Reply electronic workpaper "III F 2 LRR Grading.xls," worksheet "IIIF Unit Costs."

(c) Solid Rock Excavation

As it did with loose rock excavation, WFA/Basin built their unit cost per cubic yard for excavating solid rock by starting with prices from the Means Handbook. However, WFA/Basin have not provided any explanation of the process they used to determine the type of blasting that would be required to remove the solid rock from its beds, nor do they provide any explanation for the equipment they selected for loading, transporting, dumping and compacting solid rock. The only justification they offer is that their equipment and blasting selections, and therefore their unit costs, are consistent with those approved by the Board in previous stand-alone cases.

It appears from their workpapers that WFA/Basin used the Means Handbook to find the lowest unit costs for the solid rock components and selected them without any regard for the amount or type of rock that will be encountered during the construction of the LRR. BNSF reviewed WFA/Basin's selections and concluded that for most of the solid rock excavation components, WFA/Basin chose the wrong component. WFA/Basin's unit cost development of solid rock excavation is summarized in the following table.

Table III.F.2-4
WFA/Basin's Unit Cost Development of Solid Rock Excavation

Means Unit	Embankment	Waste	Weighted
Drilling and blasting rock over 1500 CY	$8.92	$8.92	$8.92
Bulk drilling and blasting	$5.53	$5.53	$5.53
Avg Drilling and blasting	$7.23	$7.23	$7.23
Excavate and load blasted rock, 3 CY power shovel	$1.42	$1.42	$1.42
Off Highway hauler 42 CY rear bottom dump 1/2 mile round trip	$1.78	$1.78	$1.78
Spread dumped material by dozer-no compaction	$1.60	$1.60	$1.60
Avg. Compacting	$0.82		$0.57
TOTAL	**$12.84**	**$12.02**	
Embankment/Waste Split	70.0%	30.0%	
Weighted Cost			**$12.59**

Source: WFA/Basin Opening electronic workpaper, "LRR GRADING.xls," worksheet "IIIF Unit Costs."

The first problem is WFA/Basin's selections from Means for blasting costs. WFA/Basin select the unit price for "drilling and blasting only, rock, open face, over 1500 CY" and the unit price for "bulk drilling and blasting, can vary greatly, average" and then, without explanation, simply average the two blasting prices. WFA/Basin provided no explanation of why or how they determined the two unit prices they selected would be applicable to the LRR construction and, indeed, they are not. Both unit costs selected reflect the economies attributable to large scale blasting operations. In fact, the bulk drilling and blasting average cost selected by WFA/Basin typically relates to bulk blasting in quarry operations. The economies that produce these lower average unit costs will not be available to the builders of the LRR. The amount of solid rock along the route – even before considering WFA/Basin's solid rock unit cost adjustment[59] – is not great enough to generate such economies. Based on WFA/Basin's earthwork calculations, solid rock excavation on the LRR will involve slightly less than 1.5 million cubic yards spread over its 68.7 route miles that have attributable solid rock.[60] This results in an average of approximately 21,770 cubic yards per mile.[61] At these volumes, the economies attributable to the bulk drilling and blasting cost in Means could never be achieved and the use of that unit cost here must be rejected.

The appropriate blasting unit cost for the LRR is one that recognizes that while certain economies might be available in blasting larger beds of solid rock, most of the blasting that will occur will be less than "bulk." BNSF Engineering Consultants corrected WFA/Basin's blasting price to conservatively reflect only the price of "drilling and blasting only, rock, open face, over 1500 CY."

Blasting of solid rock produces rubble of all shapes and dimensions, ranging from dust and pebble size fragments to large boulders. Standard engineering practice is to not permit rock greater than 24 inches in size to be used as fill. This practice is confirmed by the WRPI construction contract documents. Section 204 – Embankment construction instructs:

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[59] As explained in more detail below, WFA/Basin arbitrarily reduce the unit cost of solid rock excavation by asserting that half of the materials that were classified by the ICC valuation engineers as solid rock would be rippable by modern earthmoving equipment. Based only on that assertion, WFA/Basin developed a unit cost that is an average of the solid rock and loose rock unit costs they developed from Means and applied that average unit cost to the solid rock quantities developed from the Engineering Report data.

[60] WFA/Basin Opening electronic workpaper "LRR GRADING.xls," worksheet "IIIF_12 EW Cost."

[61] Taking into account WFA/Basin's assertion that half of what was classified as solid rock would be rippable by modern earthwork equipment would reduce the amount of material requiring blasting to only 10,885 cubic yards per mile.

> When rock, cemented boulders, and other embankment materials are excavated at approximately the same time, the rock shall be incorporated into the outer portion of the embankment and the other material shall be incorporated into the center of the fill. Care shall be utilized during the placement of the fill to ensure that those materials containing rock also contain sufficient finer material to fill the voids and allow uniform compaction. The rocky fill material shall be placed in a manner that insures the rocks are uniformly distributed. No rocks larger than 24 inches shall be allowed in the fill. Rocks which hinder uniform compaction of the compactable materials shall either be reduced in size as necessary to obtain the desired compaction or shall be wasted. No rock fragments larger than 4 inches in their greatest dimension will be permitted in the upper 6 inches of the subgrade.

WRPI Construction Specifications Section 204.03.4.[62] It is unrealistic to assume that in areas of solid rock excavation that all fragments will be appropriately sized without the need for any of the rocks to "be reduced in size . . . to obtain the desired compaction."

Second, large boulders cannot be handled efficiently by mechanical earthmoving equipment. Again, the WRPI construction contract documents are instructive. In Section 213 – Blasting, the WRPI contract documents state:

> Blasting shall be in accordance with these specifications and the requirements of the General Conditions. Blasting shall be used in cut sections only as necessary to loosen rock or cemented material and to reduce those materials to sizes that can be handled by mechanical earth moving equipment.

WRPI Construction Specifications Section 213.01.1.[63]

In addition, the Means unit costs under "Drilling and Blasting" recognize that there is an added cost associated with handling large boulders as the following examples demonstrate:

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[62] BNSF Reply electronic workpaper "Solid Rock.pdf."

[63] BNSF Reply electronic workpaper "Solid Rock.pdf."

02315-416-5000	Excavate and load boulders, less than 0.5 CY	$11.50
02315-416-5020	Excavate and load boulders, 0.5 CY to 1 CY	$13.55[64]

These higher costs reflect the fact that production rates for the excavation of blasted rock rubble are considerably lower than those achievable in bulk loading operations like quarries. Indeed, both of these costs are multiples of the $1.41 per CY RS Means cost (before indexing) used by WFA/Basin to excavate and load blasted rock with a 3 CY power shovel. The unit price selected by WFA/Basin clearly assumed that the material that is left after drilling and blasting the solid rock is a suitable size for fill or waste and that the material will be small enough to be easily excavated and placed into the trucks. Thus, WFA/Basin basically ignored the cost of the additional effort required to deal with boulders.

There are two ways to correct this deficiency in WFA/Basin's excavation unit costs. The first is simply to substitute the higher Means cost for excavating boulders in place of the excavation cost used by WFA/Basin. The second is to add costs to reduce those boulders that are needed for embankment to a manageable size that will allow the proper excavation equipment to achieve its rated production capacity. To minimize the amount of dispute between the parties, BNSF Engineering Consultants have decided to accept WFA/Basin's cost to excavate blasted rock with a 3 CY shovel, but to include the added cost of reducing blasted rock to a manageable size.

Based on their collective experience, BNSF Engineering Consultants determined that 40 percent of the blasted rock rubble meets the standard maximum of 24 inches criteria and can be used without further processing as embankment. They assumed that 30 percent of the blasted rubble exceeds the 24-inch maximum and will require additional drilling and blasting to meet the

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[64] BNSF Reply electronic workpaper "Solid Rock.pdf."

24-inch maximum standard. For the remaining 30 percent of the blasted rock that is too large for use as fill and will be wasted, they assumed that one-sixth of the materials (approximately five percent of all blasted materials) would be too large to be transported by truck and would require additional drilling and blasting. Because all of this waste material is oversized, the 3 CY shovel assumed to excavate and load blasted rock materials for use as embankment will not be able to handle these larger pieces. As such, the $1.41/CY unit cost cannot apply. For these materials, the following Means cost is applicable:

02315-416-2800 Boulders under 1/2 CY, loaded on truck, no hauling $14.90[65]

BNSF's assumptions are summarized in the following table.

Table III.F.2-5
BNSF's Assumptions For Solid Rock Excavation

Breakdown of Blasted Rock Rubble	Embankment	Waste	Combined
Additional Blasting			
Rubble suitable for embankment without further blasting	40.0%		40.0%
Boulders, drilled and blasted	30.0%	5.0%	35.0%
Boulders wasted without further blasting		25.0%	25.0%
TOTAL	70.0%	30.0%	100.0%
Applicable Excavation			
Excavate and load blasted rock, 3 CY shovel	70.0%		70.0%
Boulders under 1/2 CY, loaded on truck, no hauling		30.0%	30.0%
TOTAL	70.0%	30.0%	100.0%

Source: BNSF Reply electronic workpaper "III F LRR Grading.xls," worksheet "IIIF Unit Costs."

For boulders that require additional drilling and blasting, BNSF Engineering Consultants selected the following cost from Means:

02315-340-2900 Boulders, drilled, blasted $24.00[66]

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[65] BNSF Reply electronic workpaper "Solid Rock.pdf."

[66] BNSF Reply electronic workpaper "Solid Rock.pdf."

The table below summarizes BNSF's restatement of solid rock excavation costs.

Table III.F.2-6
BNSF's Development of Solid Rock Excavation

Means Unit	Embankment	Waste	Weighted
Drilling and blasting rock over 1500 CY	$8.92	$8.92	$8.92
Dozing ripped material, 300 HP, 100' Haul	$2.35	$2.35	$2.35
Boulders drilled, blasted	$9.81	$3.82	$8.01
Excavate and load blasted rock, 3 CY shovel	$1.42	$1.42	$1.42
Boulders under ½ CY, loaded on truck, no hauling	$0.00	$14.98	$4.49
42 CY rear or bottom dump, ½ mile haul	$1.78	$1.78	$1.78
Spread dumped material, by dozer, no compaction	$1.60	$1.60	$1.60
Avg. compaction	$0.82		$0.57
TOTAL	**$25.70**	**$34.87**	
Embankment/Waste Percentage	70%	30%	
Weighted			**$29.15**

Source: BNSF Reply electronic workpaper "III F LRR Grading.xls," worksheet "IIIF Unit Costs."

WFA/Basin did not apply the solid rock unit price they developed from Means to the LRR solid rock quantities estimated from the engineering reports. Instead, WFA/Basin assert that because modern earthmoving equipment is capable of ripping materials that were classified by the ICC Valuation Engineers as solid rock, the applicable unit cost should be the average of the Means developed cost for loose rock and solid rock. BNSF Engineering Consultants agree that modern day equipment is more capable than the vintage equipment available at the time the engineering valuations were conducted. Because they did not conduct a detailed special study of the type of rock that would be encountered during the construction of the LRR, they accept WFA/Basin's assertion. The weighted unit cost applied by BNSF Engineering Consultants to the LRR solid rock quantities is $19.74 per cubic yard.

WFA/Basin attempt to justify their inappropriate selection of lower costs for solid rock based on bulk excavation by using data from actual BNSF projects that WFA/Basin claim demonstrate that "excavating smaller quantities does not need to be particularly expensive."

WFA/Basin Opening Nar. at III-F-41. WFA/Basin's evidence falls far short of supporting that proposition.

WFA/Basin claim that the bid documents for Shawnee to Walker and the Tunnel #2 Daylighting projects show that unit costs for solid rock excavation can be minimal even for small projects. However, neither of those projects is representative of a project for the construction of an entire rail line where solid rock excavation is encountered in varying amounts at numerous locations along the line. In the very short 14.2-mile Shawnee to Walker Third Main project, there was little expectation that *any* rock (loose or solid) would actually be encountered, as both the bid and the August 2004 invoice confirm. The bid estimate was a mere { } of unspecified rock excavation; the actual quantity for rock excavation for the project shown on the invoice was *zero*. The bid item for rock excavation was simply a place holder for the outside chance that there might be some rock excavation that would require additional expense on the part of the contractor and for which he should be reimbursed, whereas in actuality none was encountered. That bid, therefore, does not represent a bona fide bid for a solid rock excavation project – certainly not the type of project that would require the rental and mobilization of heavy equipment needed over an extended period of time.

The project for daylighting Guernsey Tunnel #2 and extending the Stokes Siding also does not support WFA/Basin's argument. First, the excavation for the Guernsey Tunnel daylighting project was not solid rock, but rather common excavation with some loose rock mixed in.[67] Second, even if the project were entirely solid rock, which it was not, that would not support WFA/Basin's position either. As discussed above, based on WFA/Basin's Opening Evidence, the amount of solid rock excavation on the LRR would not qualify for bulk excavation

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[67] WFA/Basin Opening workpaper 05749.

as it involves only 1.5 million cubic yards spread over the 68.7 route miles (including yards) where solid rock is found – *i.e.,* 21,770 CY per mile. In contrast, if the excavation for the Guernsey Tunnel were in fact solid rock, the quantity { } would be nearly { } percent of the total LRR solid rock excavation, and all of which took place in a limited, concentrated area. The entire project for daylighting the tunnel and extending the Stokes Siding was only 1.9 miles (MP 97.53 to MP 99.44) and the tunnel itself was only a portion of that mileage, as shown on the bid tab which separately identified excavation for the siding "Excavation (Unclassified)" and excavation for the tunnel "Excavation (Tunnel area only)."[68] Thus, the daylighting project is neither an example of solid rock excavation nor of "excavating smaller quantities" of solid rock, as WFA/Basin allege.

(d) Borrow

The table below sets forth WFA/Basin's development of borrow costs from Means.

Table III.F.2-7
WFA/Basin's Development of Borrow Costs From Means

Means Unit	Embankment
Front end loader - wheel mounted 5 CY bucket	$8.97
Spread dumped material by dozer – no compaction	$1.60
Hauling 20 CY dump trailer - 1 mile round trip	$2.45
Compacting	$0.82
TOTAL	$13.84

Source: WFA/Basin Opening Electronic workpaper "LRR GRADING.xls," worksheet "IIIF Unit Costs."

BNSF Engineering Consultants accept WFA/Basin's development of borrow costs.

(e) Fine Grading

WFA/Basin did not include a separate cost for fine grading. BNSF accepts the omission of a separate cost for this item because the unit cost for excavation that WFA/Basin use includes

[68] BNSF Reply electronic workpaper "Solid Rock.pdf."

fine grading. The Shawnee to Walker contract documents specify that fine grading should be incidental to the excavation costs.[69] This means that it was incumbent upon the contractor to take the costs for fine grading into account when he developed his bid for excavation.

c. Lateral Drainage

WFA/Basin extracted the linear feet of pipe per route mile for lateral drainage from ICC Engineering Reports or from the track charts for the more recently constructed segments. Their unit cost was taken from RS Means. WFA/Basin Opening Nar. at III-F-46. BNSF accepts WFA/Basin's costs for lateral drainage. Yard drainage costs are discussed below.

d. Culverts

A culvert is "an enclosed channel serving as a continuation of and a substitute for an open stream where that stream meets an artificial barrier such as a roadway, embankment or levee."[70] Culverts are used to control surface drainage, primarily to prevent standing water on the surface of the roadbed. Various factors are involved in designing a culvert, but the objective is to design an economical structure to handle the flow of water along with any debris with minimum damage to the railway or adjacent property.

WFA/Basin assumed in their Opening Narrative that there would be two different types of culverts on the LRR—corrugated metal pipe (CMP) culverts and reinforced concrete box (RCB) culverts. WFA/Basin Opening Nar. at III-F-47. WFA/Basin used CMPs for circular culverts up to 144-inch diameter regardless of the type of existing culvert. *Id.* Overall, WFA/Basin included $11.8 million for LRR culvert costs.

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[69] WFA/Basin Opening electronic workpaper "FINISHING.doc" and "FINISHING COSTS.pdf."

[70] AMERICAN IRON AND STEEL INSTITUTE, HANDBOOK OF STEEL DRAINAGE & HIGHWAY CONSTRUCTION PRODUCTS, 301 (1993). BNSF Reply electronic workpaper "Culverts.pdf."

BNSF Engineering Consultants take issue with some of the adjustments that WFA/Basin made to the culvert types and with the unit costs WFA/Basin used for their CMP and RCB culverts.

(1) Culvert Adjustments

WFA/Basin made three adjustments to the culvert inventory supplied by BNSF during discovery. First, bridges less than 20 feet were replaced with culverts. Second, all culverts up to 144 inches in diameter were built with corrugated metal pipes (CMP). Third, most box culverts were replaced with CMPs.

BNSF Engineering Consultants do not take issue with the replacement of the shorter bridges with adequately sized culverts, but dispute the use of only CMPs for circular culverts up to 144 inches in diameter, as well as some of the box culvert replacements. Specifically, BNSF Engineering Consultants disagree with the adjustments made to various underpasses, cattle passes, and multiple box culverts, as discussed below, as well as WFA/Basin's substitution of CMPs for SPPs and their adjustments for the number of tracks. Each of these is discussed below.

(a) Underpasses

WFA/Basin converted three underpasses to multiple smaller diameter CMPs. The BNSF discovery material used by WFA/Basin and included in WFA/Basin's electronic file "Culvert quantities and cost.xls," worksheet "SCD Culvert Total Cost" clearly designates these three structures as underpasses in the "description" column. The existing horizontal and vertical clearances for these underpasses are consistent with the uses for which these underpasses were designed, which is primarily vehicles and farm equipment. WFA/Basin's substitution of smaller diameter CMPs has lowered the existing horizontal and/or vertical clearances, depending on the adjustment, of these underpasses without any demonstration that the new design can provide at least the same service to the traveling public as BNSF provides currently.

The following table demonstrates the adjustments WFA/Basin made to the three existing BNSF underpasses and BNSF Engineering Consultants' restatement on Reply. As can be seen, WFA/Basin changed the design from a single pipe to multiple pipes with different diameters, whereas BNSF maintained the existing designs for the boxes. BNSF Engineering Consultants have used structural plate pipe (SPP) culvert where the inventory shows either SPP or plated steel pipe (PSP) as those terms are generally interchangeable as both are made of pipes made of steel plates and are of the same strength.

Table III.F.2-8

Line Segment	Milepost	BNSF Existing	WFA/Basin Opening	BNSF Reply
Campbell	2.43	192" PSP	2 – 72" CMP	192" SPP
Orin	77.33	10' x 10' Box	2 – 96" CMP	10' x 10' Box
Reno	1.80	10' x 8' Box	2 – 90" CMP	10' x 8' Box

(b) Cattle Passes

WFA/Basin also converted 15 cattle passes to CMPs, some with multiple CMPs and others with an equivalent area single CMP. The existing clearances and materials used for these culverts were based on BNSF's predecessors' initial construction agreements with the adjacent landowners. WFA/Basin have not taken into consideration the landowners' concerns for the movement of cattle in making their adjustments. Therefore, BNSF has retained the clearances and materials agreed upon by BNSF and the landowners. The following table shows WFA/Basin's adjustments and BNSF's restatement on Reply.

Table III.F.2-9

Line Segment	Milepost	BNSF Existing	WFA/Basin Opening	BNSF Reply
Front Range	232.83	8' x 10' Box	2 – 90" CMP	8' x 10' Box
Orin	0.99	11' x 10' SPP	2 – 108" CMP	132" SPP
Orin	1.31	11' x 10' SPP	2 – 102" CMP	132" SPP
Orin	3.70	5' x 7' Box	2 – 60" CMP	5' x 7' Box
Orin	7.45	10' x 11' SPP	2 – 102" CMP	132" SPP
Orin	8.69	10' x 11' SPP	2 – 102" CMP	132" SPP
Orin	11.14	10' x 11' SPP	2 – 102" CMP	132" SPP
Orin	12.01	5' x 7' Box	2 – 60" CMP	5' x 7' Box
Orin	13.61	5' x 7' Box	2 – 60" CMP	5' x 7' Box
Orin	14.21	10' x 11' SPP	2 – 102" CMP	132" SPP
Orin	67.45	5' x 7' Box	1 – 84" CMP	5' x 7' Box
Orin	76.56	5' x 7' Box	1 – 84" CMP	5' x 7' Box
Orin	77.11	5' x 7' Box	1 – 84" CMP	5' x 7' Box
Orin	102.11	5' x 7' Box	1 – 84" CMP	5' x 7' Box
Orin	122.13	5' x 7' Box	2 – 60" CMP	5' x 7' Box

All but the box on the Front Range segment are designated as cattle passes in the "description" column of WFA/Basin's electronic spreadsheet "Culvert quantities and cost.xls," worksheet "SCD Culvert Total Cost." The box at MP 232.83 on the Front Range is shown on the BNSF track charts produced in discovery. Complainants used the track charts to make other adjustments to the inventory, as noted in the legend on the culvert spreadsheet cited above.

(c) Box Culverts

While BNSF does not dispute the conversion of reinforced concrete box culverts to CMPs, there are two occurrences where WFA/Basin determined the equivalent area for box culverts without properly taking into account that the existing culverts were multiple box culverts. The table below shows the impact of this error on the total drainage area and BNSF's restatement on Reply.

Table III.F.2-10

Line Segment	MP	BNSF Discovery		WFA/Basin Opening		BNSF Reply	
		Culvert	Area (SF)	Culvert	Area (SF)	Culvert	Area (SF)
Front Range	233.44	2-6'x6' Boxes	72	2–60" CMP	39	4-60" CMP	78
Orin	77.71	2-4.2'x2.7' CMPA	23	2-36" CMP	14	4-36" CMP	28

(d) Other Adjustments/Replacements

BNSF also takes issue with WFA/Basin's assertion on page III-F-46 that "consistent with the observations WFA/Basin's engineers made during their field inspection trip in November 2004, and with their own construction experience, cmp culverts are used for culverts up to 144" diameter." This is WFA/Basin's sole evidentiary basis for their changes in culvert design -- a look from afar at culverts they cannot even see because they are covered by embankment. WFA/Basin ignored available data for a large part of the LRR that provide the strength of culverts that were actually constructed on the Orin and Campbell Subdivisions.[71] As WFA/Basin have not taken the strength of the culverts into account and have made no showing that their adjustments are feasible or desirable, BNSF Engineering Consultants used the available information and constructed the culverts to their existing standards.

Moreover, WFA/Basin have not even adhered to their own standard for the LRR. WFA/Basin stated on page III-F-46 of their Opening Narrative that ". . . of course, the LRR replicates the culvert areas used by BNSF on the lines being replicated." Yet, in determining the equivalent CMP diameter for the SPP culvert at Milepost 104.00 on the Orin Subdivision, WFA/Basin replaced a single 186-inch diameter SPP with a single 144-inch CMP. This is hardly an equivalent area. BNSF Engineering Consultants have built the 186-inch SPP.

[71] BNSF Reply electronic workpaper "Culverts.pdf."

WFA/Basin replaced all SPPs with an equivalent-sized CMP without any discussion or backup showing that the CMPs provide the same structural stability and life as the existing culverts. Exhibit JRM – 3B to the Masters' Testimony, which WFA/Basin relied on for data on the Orin Line, shows that a majority of culverts with diameters of 90 inches and greater were constructed as SPPs.[72] Therefore BNSF Engineering Consultants constructed the LRR using that standard. Culverts that were designated as either SPP or PSP in the BNSF inventory were constructed as SPPs by BNSF.

(e) <u>Adjustments for Number of Existing Tracks to Proposed Tracks</u>

WFA/Basin adjusted the lengths of culverts where the existing number of tracks differed from that proposed for the LRR, but their methodology was inconsistent. WFA/Basin adjusted the existing length of culverts under multiple tracks down to a length that would represent the culvert length under a single track by removing 25 feet for every existing BNSF track in excess of one. However, to adjust from single track to multiple track, WFA/Basin added only 15 feet to the single track culvert length for every additional track on the proposed LRR, even though WFA/Basin specified that the LRR is built with 25-foot track centers.[73] BNSF Engineering Consultants corrected this error in their restatement of culvert lengths.

(2) <u>CMP Unit Costs</u>

As discussed in Subsection III.F.2.d(1) above, WFA/Basin ignored the detailed culvert information provided by BNSF, which included the location, size, type and length of all culverts in the state of Wyoming, and instead constructed all circular pipes as CMPs. For the reasons

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[72] BNSF Reply electronic workpaper "Culverts.pdf."

[73] WFA/Basin Opening electronic workpaper "Culvert Quantities and Cost.xls," worksheet "SCD Culvert Total Cost."

stated above, BNSF follows the actual culvert construction standards in its restatement of the LRR culvert costs. For the CMPs that BNSF constructs, BNSF Engineering Consultants take issue with the unit costs used by WFA/Basin.

WFA/Basin used a 2005 price quote from Lane Metal Products Division of Lane Enterprises[74] for all circular culverts on the LRR. However, WFA/Basin did not obtain quotes for adequately designed culvert material.

First, the price quotes from Lane are for CMPs with gages that are not representative of the gages that exist for the culverts located on the lines replicated by the LRR. As Exhibit JRM – 3B demonstrates for the Orin Subdivision projects from Reno to Bill and Bill to Orin, and as shown on the Gillette North project documents for the Campbell Subdivision (the same data used by complainants for grading quantities), the types of culverts that were designed and constructed by BNSF have stronger gages than those the complainants plan to construct on the lines replicated by the LRR. The gages are dependant on the loads that the pipe is expected to handle. The only specification that WFA/Basin provided to Lane for the culvert quote was that the culverts bear E80 Loading. No other data, such as the location of the culvert or the amount of fill located above the culvert, were provided by WFA/Basin for use in determining the pipe strength required.

BNSF accepts the Lane material cost and gage for culverts with diameters of 24 to 42 inches. For culverts with diameters of 48 to 84 inches, BNSF Engineering Consultants have adjusted the Lane material prices to account for the increase of gage required for these larger culverts. This is determined by using the percentage increase in steel weight between the culverts that WFA/Basin constructed and those BNSF constructed on restatement. BNSF used

[74] WFA/Basin Opening electronic workpapers "Lane1.pdf" and "Lane2.pdf."

the CMP weight charts available on the Lane website, which are included in BNSF's workpapers.[75]

BNSF also accepts the labor, equipment, profit and overhead costs per linear foot that WFA/Basin calculated for the 24 to 84-inch diameter CMPs. BNSF takes issue, however, with the costs for these items associated with CMPs with diameters greater than 84 inches, as these costs are unsupported. RS Means provides costs only for CMPs up to 72 inches in diameter. In their electronic workpaper "Culvert Quantities and Costs.xls," worksheet "Culvert Price List," WFA/Basin use the materials, labor, equipment and overhead and profit costs for the 72-inch CMP and apply that to all CMPs between 72 and 90 inches. For CMPs with diameters of 96 inches or greater, WFA/Basin make a seemingly arbitrary adjustment to the costs for labor, equipment and overhead and profit, but provided no backup or explanation for these adjustments. Thus, these costs should be rejected out of hand as being totally unsupported.

As BNSF constructed all circular pipes with diameters greater than 84 inches as SPPs for the reasons stated above, BNSF's Engineering Consultant Ms. Gouger did not attempt to ascertain the proper costs for CMPs of these sizes, but instead used SPP costs as discussed below.

WFA/Basin also ignored real-world evidence from the Masters' Testimony Exhibit JRM – 3B, which showed that approximately 87% of culverts on the original construction from Reno to Orin and on the Campbell Subdivision had been treated with a protective coating. Accordingly, BNSF Engineering Consultants included a coating for all culverts with diameters of 48 inches or greater. This is approximately 80% of the LRR culverts and thus a conservative estimate of the existing culverts that have been coated.

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[75] BNSF Reply electronic workpaper "Culverts.pdf."

BNSF's Reply electronic workpaper "III F 2 Culverts.xls," worksheet "Culvert Design" compares WFA/Basin's Opening culvert sizes and gages, the BNSF actual culvert sizes, gages, and coating status, with BNSF's restated culvert sizes, gages and coating for the LRR on Reply. BNSF's unit cost for coating is an RS Means unit cost for bituminous coating.

(3) SPP Unit Costs

While WFA/Basin did not construct SPPs, materials unit costs for four different size SPP arches were included in the culvert quote they received from Lane. In their spreadsheet "Culvert Quantities and Costs.xls," worksheet "Culverts Price List," WFA/Basin applied an RS Means labor and equipment cost for a 6' x 3' concrete box[76] to the materials cost for each arch even though the arches vary in size from 14'x 9' to 20'x 13'.

Although there are no SPP arches on the LRR, BNSF Engineering Consultants used the Lane quotes to determine the material price for SPP circular culverts. SPP culverts are typically priced by the weight of the culvert. Lane's website provides weights for both circular and arched SPPs. Of the four SPP arch quotes that Lane provided, weights were available for two of them. The calculated price per pound for both SPP arches was the same – $0.85 per lb., – confirming that this is an appropriate method for deriving a unit cost per pound. BNSF Engineering Consultants then determined the weight of the circular SPPs on the LRR and applied the average per pound cost derived from the Lane quote to develop the material costs for the circular pipes.[77]

The labor, equipment and overhead and profit were calculated using the same method as WFA/Basin, except that a more appropriate RS Means construction cost -- "Multi-plate arch,

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[76] WFA/Basin Opening electronic workpaper "100.pdf."

[77] BNSF Reply electronic workpaper "Culverts.pdf."

steel" -- was used instead of "Box culvert, precast, base price, 8' long, 6' x 3.'"[78] Although multi-plate SPPs are more desirable because of their additional strength, their installation is more complex than for box culverts. Thus, the box culvert installation costs used by WFA/Basin do not reflect accurately the installation cost for SPPs. WFA/Basin's replacement of SPPs with CMPs is another example of substituting less efficient construction standards and products in order to achieve lower costs.

As with CMPs, SPPs are also given a protective coating before installation. Both the Campbell Subdivision original construction specifications and the Shawnee to Walker Addendum clarifications required coating of SPPs.[79] Construction photos from the Shawnee to Walker project show the coating being applied.[80] It is therefore reasonable to assume that the original culverts (most of which are underground) were properly coated when they were installed. Accordingly, BNSF Engineering Consultants included in their restatement of SPP costs, an RS Means cost for "Asphalt coating, with fibers, 1/16" thick".[81]

(4) RCB Unit Costs

WFA/Basin constructed a minimal number of reinforced concrete box culverts and used quotes from two sources, a 2003 quote from Hanson Pipe and Products for pipe delivered to Vernon, TX and a 2003 quote from South Dakota Concrete Products Company for pipe delivered to Gillette, WY.[82]

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[78] *See* BNSF Reply electronic workpaper "III F 2 Culverts.xls," worksheet "CULVERTS PRICE LIST."

[79] BNSF Reply electronic workpaper "Culverts.pdf." (BNSF/LR 21981, 22357)

[80] BNSF Reply electronic workpaper "Culverts.pdf." (BNSF/LR 22525).

[81] BNSF Reply electronic workpaper "Culverts.pdf."

[82] WFA/Basin Opening electronic workpapers "Hanson1.pdf," "Hanson2.pdf," "SDConcrete1.pdf," and "SDConcrete2.pdf."

BNSF Engineering Consultants take issue with WFA/Basin's use of these quotes. First, WFA/Basin do not adjust these 2003 price quotes to 2004; rather, they state them as *2005* material prices and adjust them back to 2004. On restatement, BNSF Engineering Consultants correctly indexed the 2003 prices to 2004.

Second, for culvert sizes where both sources gave a quote, WFA/Basin average the two supplier quotes. This is unacceptable because the quotes from Hanson are delivered to Vernon, Texas (see WFA/Basin electronic workpaper "Hanson1.pdf") which is 847 miles from Moba, Wyoming. WFA/Basin's averaging does not take into account the additional transportation charges to the railheads on the LRR.

Instead of calculating transportation charges from Vernon, TX to the railheads on the LRR, BNSF Engineering Consultant applied the 2003 price quoted by South Dakota Concrete Products Company for pipes delivered to Gillette, Wyoming to the box culverts that BNSF constructed on the LRR. The culverts are highlighted in BNSF's Reply electronic spreadsheet "III F 2 Culverts.xls," worksheet "CULVERTS PRICE LIST." BNSF accepts WFA/Basin's unit costs from RS Means for labor, equipment, profit and overhead for RCB installation.

WFA/Basin also neglect to add waterproofing to the box culverts. BNSF required waterproofing on the RCBs installed on the Shawnee to Walker third main project, as can be seen in the construction photos in BNSF's electronic workpaper "Culverts.pdf" at BNSF/LR 22515 and 22529. BNSF Engineering Consultants have added the waterproofing cost to the box culverts.

(5) Installation Costs

BNSF Engineering Consultants accept WFA/Basin's quantities and costs for culvert installation. BNSF's total restated cost for culverts on the LRR is $19.0 million.

e. Other

(1) Drainage Ditches

WFA/Basin used trapezoidal drainage ditches that are two feet wide and two feet deep, based on the Board's decisions in *Duke/NS, Carolina, Duke/CSX, WPL* and *TMPA.* BNSF Engineering Consultants accept WFA/Basins's ditch costs.

(2) Retaining Walls

WFA/Basin used information in the ICC Engineering Reports to determine retaining wall quantities and used a unit cost from RS Means for gabions (galvanized steel mesh boxes filled with rock) as the material for constructing the walls. BNSF agrees with the quantities of retaining wall that WFA/Basin determined from the ICC Reports.

BNSF Engineering Consultants also agree with the RS Means unit cost for construction quality gabions selected by WFA/Basin.

The total costs for retaining walls are included in BNSF Reply Exhibit III.F-1.

(3) Rip Rap

WFA/Basin developed rip rap quantities from the ICC Engineering Reports and from the Orin and Campbell Subdivision construction documents. They included the material cost and placement cost from Means. WFA/Basin Opening Nar. at III-F-52. BNSF accepts WFA/Basin's rip rap costs.[83]

(4) Utility Relocation

WFA/Basin included utility relocation costs for the LRR segments that have been constructed within the past 30 years, namely, the Orin, Campbell and Reno Subdivisions. The

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[83] BNSF Reply electronic workpaper "III F LRR Grading.xls."

per mile unit cost was taken from the *WTU* decision[84] and indexed from 1994 to 2004 using the AAR Western Region Materials, Prices, Wage Rates, and Supplements Combined (fuel excluded) Index.[85] As a threshold matter, the AAR index (which WFA/Basin used for environmental compliance costs as well) is not the appropriate index for these construction cost items. RS Means is a more accurate index for construction costs. The use of the RS Means index is consistent with the Board's use of that index in calculating its regression of construction costs in *Xcel.*[86] WFA/Basin themselves used RS Means as the historical index for all construction items other than utility relocation and environmental compliance, including rail and OTM.

In addition, BNSF Engineering Consultants take issue with relying on information from a prior case when more relevant data are available. BNSF made available to Complainants actual plans for the Orin Subdivision from MP 21.1 to MP 87.6.[87] These plans identify the location of existing utilities and specify the action (relocate, remove, or encase) that was required during the original construction. In addition, the plans for the segment between MP 43.7 and MP 87.6 also included detail sheets for each pipeline that provided the encasement pipe diameter and length. The encasement diameter in each instance was four inches wider than the pipe being encased. BNSF followed that pattern to determine the encasement sizes for the utility pipes identified in the plans for the segment between MP 21.1 and MP 43.7. BNSF Engineering Consultants used the actual encasement length when available, and where data were not available, used 100 feet.

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[84] WFA/Basin Opening Nar. at III-F-53.

[85] WFA/Basin Opening electronic workpaper "LRR GRADING.xls," worksheet "IIIF_13Othr Cst."

[86] *Xcel, slip op. at 30.*

[87] BNSF Reply electronic workpapers "Cordero to Reno Plans.pdf." and "Reno to Bill Plans.pdf."

Generally, utility adjustments are completed by the pipeline owner, who is then reimbursed by BNSF. But in this instance, the grading contractor for the Shawnee to Walker project was responsible for a pipeline encasement as a change order. The change order called for the contractor to encase 130 feet of a 4-inch pipeline with an 8-inch split casing at a cost of ${ }.[88] BNSF Engineering Consultants derived a unit cost per linear foot from this information and used that cost (${ } per linear foot) to determine the costs for other size casing pipes. They then used the 2005 RS Means unit cost for various sized steel casing pipes to determine the percentage difference from the 8-inch diameter to the various sizes noted in the original plans and applied that percentage to the ${ }/LF unit cost to determine the unit costs for the other diameter pipe casings.

The total cost of the utility adjustments between MP 21.1 to MP 87.6 was developed in BNSF electronic workpaper "III F 2 Utilities.xls" and then used to determine a per mile cost based on the available 66.5 miles of utility data. The per mile cost was applied to the newer segment miles using a method similar to that used by WFA/Basin.

(5) Slope Stabilization (Topsoil Placing/Seeding)

WFA/Basin included costs for placing topsoil only in locations where BNSF incurred those costs. They used quantities based on the Masters' testimony in *IPS* for the line segments from Eagle Butte Jct. to Campbell and Donkey Creek to Bridger Jct. (including the Reno Branch and the LRR-owned portions of the mine spurs). For the other LRR line segments, WFA/Basin used quantities obtained from the ICC Engineering Reports. WFA/Basin Opening Nar. at III-F-53 to 54. WFA/Basin used the unit costs for placing topsoil and for seeding from the Shawnee to Walker project. BNSF accepts WFA/Basin's topsoil and seeding costs.

[88] BNSF Reply electronic workpaper "Utilities.pdf."

(6) Water for Compaction

WFA/Basin used the unit cost for water for compaction from the Shawnee to Walker project invoice, which BNSF accepts. However, WFA/Basin ignored the amount of water required for a CY of embankment that was also included on the Shawnee to Walker invoice.[89] BNSF Engineering Consultants added the additional project information to electronic workpaper "III F 2 LRR Grading.xls," worksheet "IIIF_13Othr Cost," which changes the amount of water required per CY of embankment from 18.5 gallons to 20.3 gallons.

(7) Road Surfacing

Road surfacing includes the cost for the construction of road detours that are built during construction, and the resurfacing of existing roads that are damaged during the construction process. WFA/Basin included costs for providing road detours on the newer line segments, using 6-inch deep gravel at 10 feet wide and 300 feet long for detours at private highway crossings, and 24 feet wide and 500 feet long for detours at public crossings. WFA/Basin Opening Nar. at III-F-55 to 56.

BNSF accepts WFA/Basin's road surfacing costs. Total costs for road surfacing are included in BNSF Reply Exhibit III.F-2.

(8) Construction Site Access Roads

WFA/Basin did not include costs for any construction site access roads to the LRR because (1) the LRR right-of-way is accessible from highways and roads, and (2) BNSF construction specifications state that costs for such roads will be considered incidental to other

[89] WFA/Basin Opening electronic workpaper "walker to shawnee unit cost.pdf" included in BNSF Reply electronic workpaper "Water for Compaction.pdf."

items of the contract. WFA/Basin Opening Nar. at III-F-56. BNSF agrees with WFA/Basin's interpretation.

(9) Environmental Mitigation

Measures to control environmental factors are necessary expenditures in constructing a railroad and a natural outgrowth of preventive measures taken as part of the normal construction process. WFA/Basin did not include any costs for environmental compliance for most LRR line segments, citing Board precedent. WFA/Basin Opening Nar. at III-F-57. WFA/Basin included $1.26 million for erosion control for the recently constructed line segments for which the railroad indisputably incurred such costs. WFA/Basin calculated a cost per mile based on the 1997 environmental compliance costs in the *FMC* decision indexed to 4Q04. They used the mileage from Caballo Jct. to South Morrill to derive a per route mile unit cost. They then applied that unit cost to the 149.3 route miles of new line segments on the LRR to develop a per mile cost of $8,471. WFA/Basin Opening Nar. at III-F-57 and Exhibit III-F-13.

Rather than use the environmental costs from 1997, since BNSF current costs are being used for many of the expenses in this case, BNSF Engineering Consultants used the August 2004 Shawnee to Walker invoice for actual expenses for environmental compliance. The invoice and construction plans for the project were provided to WFA/Basin in discovery. The documents bates stamped BNSF/LR 22621 to 22625 are the storm water prevention plans that the contractor was responsible for implementing on the project. The document provides the quantities for silt fence, ditch checks and subballast drains. These quantities represent only one half of the costs that would be incurred on a new line construction because only one half of the roadbed was being disturbed on the Shawnee to Walker project, and thus disturbing only one linear ditch. BNSF Engineering Consultants, therefore, doubled the expenses attributable to the storm water costs in the August Shawnee to Walker invoice and attributed them to the newer segments of the LRR.

The August invoice had two bid items that fall under environmental compliance – Stormwater Mgmt and Maintenance and Install Subballast Drains. The lump sum cost for the Stormwater is ${ } and the Install Subballast to date cost is ${ } for a total cost or ${ }. Doubling this cost and distributing it across the 14.2 miles equals a per mile cost of ${ }.[90] BNSF's calculations are in BNSF Reply electronic workpaper "III F 2 LRR Grading.xls," worksheet "IIIF_Othr Cst."

(10) Land for Waste Quantities

WFA/Basin assumed that 30 percent of the material excavated during the construction of the LRR would not be re-used as embankment and would instead be wasted along the right-of-way. WFA/Basin included costs for additional land along the right-of-way to accommodate the dumping of the waste material, assuming an average 15-foot depth. WFA/Basin Opening Nar. at III-F-44. BNSF Engineering Consultants agree with the waste ratio and accept WFA/Basin's calculation of these additional costs.[91]

(11) Guernsey Yard Paving, Drainage, Lighting and Fencing

WFA/Basin included costs for yard drainage, lighting, and fencing in the Guernsey yard, South Logan and Donkey Creek yards as well as roads in Guernsey. WFA/Basin Opening Electronic workpaper "Building and Sites.xls."

WFA/Basin includes 148,783 SY of gravel roadways in the Guernsey yard at a cost of $2.3 million. WFA/Basin includes costs for drainage and lighting of $12.2 million.

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[90] BNSF Reply electronic workpaper "Environmental Compliance.pdf."

[91] BNSF Reply electronic workpaper "III F 2 LRR Grading.xls."

BNSF Engineering Consultants agree with WFA/Basin's quantities and the gravel road unit cost they apply to the surfacing quantities. The change in quantity is due to the adjustments in the Guernsey yard.

For drainage in the LRR yards, BNSF Engineering Consultants added costs for a foundation and inverts for the catch basin. BNSF Engineering Consultants' critique of WFA/Basin's yard lighting cost is contained in Section III.F.7 Buildings and Facilities. BNSF Engineering Consultants add costs for bollards and correct the unit cost typing error for the 400 watt HPS for yard lighting as discussed in Section III.F.7.[92]

Each of the changes described above is reflected in BNSF's restatement of these costs in Reply electronic workpaper "III F 2 LRR Grading.xls."

f. ROW Retaining Walls

WFA/Basin emphatically stated that they would not acquire any land for the LRR beyond a 100-foot ROW. BNSF Engineering Consultants have adhered to WFA/Basin's limitation, although to accommodate the roadbed width, slopes, and access roads on each line segment, as can be seen in BNSF electronic workpaper "III F 2 LRR Grading.xls," worksheet "IIIF 10_CY Grad," major portions of the Orin, Reno and Campbell Subdivision would require larger ROW widths. In order to stay within the 100-foot ROW, construction must stop abruptly at the ROW line. In cut sections, this means that there may be a substantial disparity between the level of the end of the ROW and the adjacent ground level. Thus, a retaining wall is necessary to hold back the dirt along the ROW. In fill sections, the level at the end of the ROW may be considerably above the adjacent ground level, requiring a retaining wall to hold up the roadbed.

[92] BNSF Reply electronic workpaper "Yard Drainage and Lighting.pdf."

To determine the amount of additional retaining wall that would be required to accommodate WFA/Basin's 100-foot ROW limitation,[93] BNSF Engineering Consultant Ms. Gouger first reviewed the ROW width based on the track sections, which include the designated 25-foot track centers and 13-foot access roads. She calculated an average ROW width for the entire 219.53 LRR route miles of over 103 feet. She then calculated the average ROW for all the grading sections and determined that the Orin, Reno and Campbell subdivisions widths are greater than 100 feet as shown below.

From	To	Average ROW Width
Eagle Butte Jct	Campbell	114.24
Donkey Creek Jct	Reno	107.16
Reno	Black Thunder	103.81
Reno	Bridger Jct	118.23

Thus, only these segments would require additional retaining walls.

In determining the height of the retaining walls that would be required for these segments, Ms. Gouger assumed that there would be a wall only on one side of the section, as shown in the drawings of a typical section of the Eagle Butte to Campbell segment and of the Reno to Bridger Jct. segment,[94] which show the location of the retaining wall relative to the section. She also used the same assumption relative to excavation that WFA/Basin made on Opening – *i.e.*, that the common excavation from both the Campbell and Orin subdivisions was evenly distributed along the entire length of the subdivision. As shown in BNSF Reply electronic workpapers "III F 2 LRR Grading.xls," worksheets "IIIF_9 Orin EW" and "IIIF_9 EB_EW," this assumption yielded the average heights that were used to determine the quantities

[93] These are retaining walls that would be required in addition to those that were actually constructed and discussed in Section III.F.2.e.(2).

[94] BNSF Reply electronic workpaper "ROW Retaining Wall.pdf."

per mile of common excavation for these segments.[95] Therefore, Ms. Gouger assumed that the same average heights for Campbell and Orin of 16.02 and 11.29 feet, respectively, would be used to determine the necessary limits of construction. Where the necessary limits of construction exceed WFA/Basin's 100-foot ROW, retaining walls are required.[96] Based on these assumptions, Ms. Gouger determined the average heights of retaining wall for each of the line segments as follows:

From	To	Retaining Wall Height
Eagle Butte Jct	Campbell	9.5 feet
Donkey Creek Jct	Reno	4.8 feet
Reno	Black Thunder	2.5 feet
Reno	Bridger Jct	12.1 feet

Where BNSF Engineering Consultants added retaining walls, the quantity of excavation outside the retaining walls was not included in their earthwork calculations.

BNSF Engineering Consultants' approach to calculating the necessary retaining walls to keep within the WFA/Basin designated 100-foot ROW of averaging over the length of each segment is conservative considering that the excavation would not occur over the entire length but in fact over a much smaller area. This would mean that the amount of excavation that would need to take place outside of the 100-foot ROW would increase. Moreover, if one were to assume that the excavation occurs on half of the segment length and embankment occurs on the other half, the retaining wall heights would more than double. In fact, the Orin line segments (Donkey Creek to Reno, Reno to Black Thunder and Reno to Bridger Jct) would go from 4.8,

[95] This approach of accommodating only the excavation along the entire grading segment is used for quantification only. It does not mean that retaining walls are actually necessary along the entire segment, but sporadically in cuts and fills at various heights, which would result in an averge height along that segment.

[96] BNSF Reply electronic workpaper "ROW Retaining Wall.pdf,"

2.5, and 12.1 foot walls to 21, 19, and 29 feet, respectively, when adjusting the assumptions. As the height of the walls increases, the cost increases.

Another reason why this approach is conservative is that portions of this route would be in embankment. Since 70 percent of the excavation is assumed to be placed as embankment, those areas would likely need retaining walls as well. Using an assumption that 50 percent of the route is in embankment would result in around 18 feet of fill for the three Orin segments instead of the 10 feet of fill based on BNSF's assumption that the fill occurs along the entire length of the LRR, as shown on the diagram of the embankment sections for the Orin Subdivision in BNSF Reply electronic workpaper "ROW Retaining Wall.pdf." Ten feet of fill does not require retaining walls, but increasing that height would mean that retaining walls would be necessary. Therefore, BNSF's approach in determining the height and length of retaining walls necessary to keep the construction within the 100 foot ROW designated by WFA/Basin is conservative.

BNSF uses an RS Means cost for cast in place retaining walls with heights of 4, 6, 10 and 12 feet.[97] The total cost for retaining walls is $237.5 million.

g. Summary

The table below summarizes the grading (roadbed preparation) costs that BNSF Engineering Consultants determined would be necessary to construct the railroad to the specifications necessary to meet the tonnage requirements of LRR and compares those costs to WFA/Basin's estimates. Details of the calculations for earthworks are included in BNSF Reply Exhibit III.F-2.

[97] BNSF Reply electronic workpaper "ROW Retaining Wall.pdf."

Table III.F.2-11
Summary of Grading Costs

Item	BNSF Total Cost ($Millions)	WFA/Basin Total Cost ($Millions)	Difference
Earthwork			
Common	$86.81	$67.75	$19.06
Loose Rock	$7.85	$6.10	$1.75
Solid Rock	$32.94	$16.04	$16.90
Borrow	$19.16	$19.04	$0.12
Earthworks – Total	$146.77	$108.93	$37.84
Water for Compaction	$4.41	$3.18	$1.23
Clearing	$0.34	$0.10	$0.24
Grubbing	$0.04	$0.04	$0.00
Undercutting	$1.65	$0.00	$1.65
Foundation Conditioning – Exc.	$6.38	$0.00	$6.38
Eoundation Conditioning – Emb.	$0.96	$0.00	$0.96
Lateral Drainage	$0.06	$0.06	$0.00
Retaining Walls	$0.05	$0.05	$0.00
Rip Rap	$0.61	$0.61	$0.00
Road Surfacing	$0.48	$0.48	$0.00
Relocation of Utilities	$1.91	$0.93	$0.98
Placing Topsoil	$1.87	$1.85	$0.02
Seeding	$1.22	$1.21	$0.01
Land for Waste Quantities	$0.21	$0.17	$0.04
Environmental Compliance	$2.25	$1.26	$0.98
Yard Lighting, Draininage and Paving	$15.82	$0.00	$15.82
Guernsey Tunnel #2 Daylighting	$14.20	$12.58	$1.62
ROW Retaining Walls	$237.53	$0.00	$237.53
TOTAL	**$436.75**	**$131.44**	**$305.31**

Source: WFA/Basin Errata electronic workpaper "LRR GRADING.xls," worksheet "IIIF Summary;" BNSF Reply electronic workpaper "III F 2 LRR Grading.xls," worksheet "IIIF Summary."

3. Track Construction

This section contains BNSF's response to the track construction evidence that WFA/Basin presented in Sections III.B and III.F. Track construction entails the procurement, transportation and installation of the many components used in the track structure for a line of railroad. In WFA/Basin Opening Exhibit III-F-1 under "Track Construction," WFA/Basin listed twenty-nine (29) track components, not including itemized labor unit costs. BNSF Engineering Consultants address in this Narrative those items where they disagree with WFA/Basin's specifications, quantities or unit costs.

The quantity of each particular track component depends in large part on the total miles of track to be constructed. In their Opening Evidence, WFA/Basin included 217.92 constructed route miles[98] and 446.51 mainline track miles.[99] There are only minor discrepancies between WFA/Basin's Opening estimate of total route miles and BNSF's route mile estimate on Reply. As described in Section III.B.1, WFA/Basin omitted 1.61 route miles. These include 0.18 miles difference between the 0.45 miles and the 0.27 miles WFA/Basin built for the east leg of the Campbell Wye, 0.16 miles for the mine spur at the Fort Union Mine, 0.03 miles to clearance point at Moba Jct., and 1.24 miles at North Antelope/Rochelle Nacco Wye Jct. (one-half of the 2.48 miles or 1.24 miles of the jointly owned wye). BNSF's track construction costs are based on its restated total of 219.53 constructed route miles.[100]

After conducting an in-depth capacity study, BNSF capacity and operating witnesses decided that no capacity improvements to the LRR were necessary. However, BNSF Engineering Consultants have made adjustments to correct errors in WFA/Basin's proposed lengths of set-out tracks, as well as to add additional set-out tracks which have resulted in an increase in total track miles. A minor adjustment of 0.68 miles to the mechanical tracks near the locomotive shop at Guernsey Yard brought the total track miles to 462.23, a total increase of 15.72 miles. *See* BNSF Reply Nar. at Section III.B.2 and Table III.B-2. These additional miles

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[98] WFA/Basin Opening Nar. at III-B-4.

[99] WFA/Basin Opening Nar. at III-B-6.

[100] *See* BNSF Reply Section III.B.1 and Table III.B-1.

of track require additional quantities for all track components, as reflected in BNSF Engineering Consultants' restatement of LRR construction costs.[101]

BNSF Engineering Consultants disagree with WFA/Basin's specifications for a number of track components for the reasons discussed in the introduction to Section III.F. BNSF has made adjustments where necessary to construct the LRR to the appropriate standards for a heavy axle loading, coal-hauling railroad, including the use of 141-pound rail on concrete ties where BNSF has them today, the use of concrete crossings, and the application of real-world track labor costs. BNSF Engineering Consultants have also adjusted the quantities of certain track components, such as rail, ballast and ties, to correct for errors and omissions in WFA/Basin's estimates. As a result of all these changes, adjustments were made to the following components:

- Geotextiles
- Ballast/Subballast
- Rail
- Wood Ties
- Concrete Ties
- Spikes on Wood Ties
- Anchors
- Transition Ties (omission)
- Turnouts
- Wheel Stops and Derails

In general, BNSF Engineering Consultants have accepted several of WFA/Basin's unit costs which have been taken from BNSF AFEs provided in discovery or are otherwise well

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[101] BNSF Reply electronic workpaper "III F LRR Construction.xls," worksheet "Track Data."

supported. However, BNSF Engineering Consultants take issue with: (1) WFA/Basin's unit costs for various rail types, as discussed in subsection (d) below, (2) WFA/Basin's failure to include the profit component of certain unit costs derived from RS Means, and (3) WFA/Basin's incorrect application of the historical index to convert unit costs to 4Q2004.

WFA/Basin's indexing error permeates most of their evidence outside of grading. For all sections other than grading, when WFA/Basin converted 2005 costs to 4Q2004, they actually inverted the ENR Construction Cost indexes in calculating the historical factor to be applied.[102] The following examples show the correct application of these indices compared to WFA/Basin's application.

To convert a 2005 price to a 4Q2004 price the proper application is:

$$\text{2005 Price} \quad X \quad \frac{\text{October 2004 Index}}{\text{January 2005 Index}} = \text{October 2004 Price}$$

$$\text{Factor} = \frac{\text{October 2004 Index}}{\text{January 2005 Index}} = \frac{7314}{7297} = 1.0023$$

WFA/Basin's Application:

$$\text{2005 Price} \quad X \quad \frac{\text{January 2005 Index}}{\text{October 2004 Index}} = ?????$$

$$\text{Factor} = \frac{\text{January 2005 Index}}{\text{October 2004 Index}} = \frac{7297}{7314} = 0.9977$$

WFA/Basin also erred in indexing costs from years other than 2005. WFA/Basin used the RS Means 2005 *estimated* historical index to develop indices for prices from 1999 through

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[102] *See* WFA/Basin Opening electronic workpaper "Historical Factors Worksheet.xls." The ENR Index used by WFA/Basin was included as WFA/Basin Opening electronic workpaper "Engineering News-Record Construction Cost Index.pdf," which shows the January 2005 ENR index as 7297 and the October 2004 index as 7314. BNSF Reply electronic workpaper "Historical Factor.pdf."

2004.[103] Applying the estimated index to adjust *2005 prices* is appropriate because the 2005 prices are also estimates. But to adjust prices from prior years, actual index data are available and should be applied. RS Means provides an *actual* historical index as of July 2004. Therefore, BNSF Engineering Consultants indexed prices from all years prior to 2005 to July 2004 and then used the ENR data included in WFA/Basin's Opening Evidence to adjust the July 2004 prices to October 2004. This adjustment slightly lowered the historical factors used by WFA/Basin for pre-2005 prices.

WFA/Basin's unit costs were developed predominantly from quotes obtained from various suppliers and, in most instances, include the cost for transportation to at least one location along the LRR. Consistent with prevailing SAC methodology, BNSF has challenged only those unit costs that are unsupported or infeasible for the construction of a Class I coal railroad – *i.e.,* where the prices represent inferior materials and construction standards that no Class I railroad building high density, heavy axle loading coal-hauling rail lines would reasonably employ. BNSF continues to urge the Board to apply rigorously the complainants' burden of proof in evaluating the feasibility of WFA/Basin's cherry picked estimates for individual items.

The major items on which BNSF takes issue with WFA/Basin's unit costs include:

- Ballast/Subballast
- Rail
- Materials Transportation
- Track Labor and Equipment

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[103] *See* WFA/Basin Opening electronic workpapers "Historical Factors Worksheet.xls" and "Historical 2005 Page 437.pdf."

The following subsections set forth BNSF Engineering Consultant Gouger's analysis of each track component for which she disagrees with either the quantity or the unit cost proposed by WFA/Basin, as well as WFA/Basin's treatment of transportation costs for these materials.

a. Geotextiles

(1) Specifications

Geotextile fabric is placed on the roadbed grade to protect the ballast and subballast from contamination and to provide additional stabilization and support in areas of poor drainage and soil quality. Turnouts and crossings are areas that generally require additional support, making them regular candidates for geotextile use. BNSF standardized construction specifications require that geotextiles be placed between the subgrade and subballast.[104] In its recent ruling in *Duke/CSX*, the Board concluded that, given the general acceptance of geotextile use by the railroad industry, the cost of placing geotextiles under turnouts and crossings generally should be included in SAC construction projects.[105]

WFA/Basin provided for geotextile placement under turnouts and at-grade crossings. WFA/Basin Opening Nar. at III-F-58. BNSF Engineering Consultants agree with the placement, but disagree with the quantities of geotextiles required at these locations.

(2) Geotextiles Under Turnouts

WFA/Basin calculated the quantity of geotextile fabric under turnouts by determining the quantity per turnout type using a formula set out in their workpapers.[106] Their Opening Evidence showed the use of a 17-foot wide strip of geotextile fabric at the point of switch end of each

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[104] BNSF Reply electronic workpaper "Geotextiles.pdf."

[105] *Duke/CSX*, slip op. at 88-9.

[106] WFA/Basin Opening Workpaper Vol. 10, pp. 05862-05865.

turnout and a widened 24-foot section at the end possessing long switch ties.[107] BNSF Engineering Consultants agree with this layout with the exception that the geotextile fabric should be extended to encompass the entire switch structure, including the transition ties ahead of the point of switch. This would require an additional section, 17-feet wide by 16-feet long, at each turnout. WFA/Basin included a two foot allowance for overlap, which is consistent with AREMA guidelines and which BNSF witnesses accept.[108] BNSF Engineering Consultants calculated the quantities for each type turnout as follows:

Turnout No.	Ahead of POS	+	Lap	+	POS to end Long Ties	x	SF to SY	=	Total
#10	272 SF		223.71 SF		2378 SF		X11.1%		**320 SY ea.**
#14	272 SF		308.57 SF		3820 SF		X11.1%		**429 SY ea.**
#20	272 SF		437.79 SF		4653.5 SF		X11.1%		**596 SY ea.**

BNSF Engineering Consultants' quantity calculations are included in BNSF's Reply workpapers.[109] The differences between BNSF's quantities and WFA/Basin's quantities per turnout are set out in the table below.

Table III.F.3-1
Comparison of WFA/Basin and BNSF Quantities
Of Geotextiles Per Turnout Size

Turnout Size	WFA/Basin Quantity per TO	BNSF Quantity per TO
No. 10	289.08 SY	320 SY
No. 14	398.73 SY	429 SY
No. 20	565.70 SY	596 SY

Source: WFA/Basin Opening Workpaper Vol. 10, pp. 05862-05865; BNSF Reply electronic workpaper "Geotextiles.pdf."

[107] *Id.*

[108] AREMA Chapter 1, Part 10 Geosynthetics, Section 10.1.5, at BNSF Reply electronic workpaper "Geotextiles.pdf."

[109] BNSF Reply electronic workpaper "Geotextiles.pdf."

(3) Geotextiles Under Road Crossings

At each point where a highway or road crosses the LRR, there will be either an at-grade crossing or a separated crossing such as an overpass or underpass. It has become standard practice to underlay the subballast of an at-grade crossing with a non-woven geotextile to add strength and to protect the subballast and ballast from the transmission of fine soil particles from the subgrade. Geotextiles also serve an important drainage function. Because the adjacent road prevents water falling on the tracks from draining off from the subgrade and subballast layer, geotextile fabric allows it to pass through to the subballast and then the subgrade but impedes the upward movement of soil particles, preventing the fouling of the ballast section.

WFA/Basin accepted in theory the placement of geotextile fabric under all at-grade crossings, but claim that their unit cost per foot for at-grade crossings already includes the geotextile costs. WFA/Basin Opening Nar. at III-F-58.[110] However, as discussed in Section III.F.8.b, BNSF Engineering Consultants disagree with the type of crossing proposed by WFA/Basin and instead have used the sturdier concrete crossings used by BNSF and UP on high density coal lines. BNSF Engineering Consultants have added the cost of providing and placing the geotextile fabric to the crossing unit cost.

(4) Unit Cost

WFA/Basin used a materials cost taken from RS Means 2005 for 600-pound tensile strength geotextile fabric, but relied on either their track labor quote from Windgate Constructors for the installation cost under turnouts or on their contractors quote for installation on crossings. BNSF Engineering Consultants do not accept either the Windgate labor costs as discussed more

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[110] In response to workpaper requests, WFA/Basin provided pages from the Duferco Farrell rehabilitation contract which stated that the contractor would place geotextiles under the crossings. WFA/Basin Opening electronic workpaper "Crossings.pdf."

fully in Section III.F.3.j below or the crossings used by WFA/Basin and therefore used the RS Means cost of $2.16,[111] which includes the materials, installation, overhead and profit.

b. Ballast and Subballast

(1) Specifications

Ballast and subballast serve to distribute heavy track loads to the native subgrade at a bearable pressure level. Additionally, the ballast holds the track structure in place and allows for regular, necessary maintenance of the track surface and alignment. Both layers drain water away from the track in order to preserve subgrade stability. The subballast layer is also essential for allowing water to escape from the ballast section and for filtering out finer grained subgrade soils to prevent intrusion into the ballast.

According to their Opening Narrative, the ballast that WFA/Basin propose to use is "locally obtained granite," crushed according to the standards laid out in the AREMA guidelines. WFA/Basin proposed to use subballast consisting of materials similar to the ballast, crushed and compacted to provide a well-graded, dense layer of crushed rock similar to a road base material. WFA/Basin Opening Nar. at III-F-59. WFA/Basin constructed the LRR mainline with a 20-inch ballast/subballast section, consisting of twelve inches of subballast and eight inches of ballast. *Id.* WFA/Basin used eight inches of ballast and six inches of subballast on mine leads and set-out tracks, and six inches of ballast and six inches of subballast under yard tracks. *Id.*

BNSF Engineering Consultants accept the ballast/subballast depths specified by WFA/Basin as appropriate for track segments using 136-pound rail on wood ties and for yard tracks. However, consistent with modern day construction standards for the Orin Line, BNSF Engineering Consultants have used concrete ties on portions of the existing BNSF line replicated

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[111] BNSF Reply electronic workpaper "Geotextiles.pdf."

by the LRR where concrete ties are being used today, as discussed in section III.F.3.c. When using concrete ties, an additional four inches of ballast are required. As a result, mainline areas built with concrete ties require 12 inches of ballast and 12 inches of subballast.

(2) Material Availability Along The LRR

(a) Ballast

WFA/Basin obtained ballast from the Guernsey Stone Quarry in Guernsey, WY, and delivered it to two locations -- Donkey Creek and Shawnee Jct. -- as shown in their electronic workpaper "Ballast and Subballast Worksheet.xls," worksheet "BALLAST UNIT COSTS." WFA/Basin calculated a transportation additive that was included in their unit costs for these materials. This transportation additive is based on the off-line cost of moving the ballast and subballast by rail to these two delivery points, and uses the per mile cost ($0.035/mile) adopted by the Board in *WPL*. WFA/Basin apparently assumed that from these two points and from the Guernsey railhead,[112] the ballast would be distributed without cost along the line over the LRR.

There are several problems with WFA/Basin's selection of sources for ballast. First, the material at Guernsey Stone Quarry is unacceptable as ballast because Guernsey Stone does not have granite ballast, which is the only type of ballast BNSF uses on heavy axle loading lines and the type of ballast that WFA/Basin specified for their ballast. Guernsey Stone ballast is dolomite, which is material found as limestone or marble. In support of their ballast selection, WFA/Basin included in their workpapers a document that they titled "Ballast Specs CSXT.pdf," which gives ballast specifications that permit the use of granite, dolomite, limestone and marble

[112] WFA/Basin developed a unit cost for ballast and subballast from Guernsey that includes a transportation cost from the Guernsey Quarry to the Guernsey railhead of $0.00. WFA/Basin Opening electronic workpaper "Ballast and subballast Worksheet.xls," worksheets "BALLAST UNIT COST" and "Ballast Subballast Cost." BNSF Engineering Consultants have added the cost to truck the subballast the short distance from the quarry to the railhead.

with an attachment giving Pennsylvania Department of Transportation criteria for the size. The CSXT document is titled "CSX Guidelines for Private Sidetracks." Thus, these specifications have no relevance to the specifications for ballast on a heavy axle rail line. In BNSF's experience with heavy axle loads, only granite is durable enough for use on these lines. In fact, in 1997, Jerry Albin of TranSystems – BNSF's Maintenance-of-Way expert in this and other SAC cases – conducted a ballast study for BNSF to locate acceptable ballast quarries across the country, and found that Guernsey Stone did not qualify as a source of granite. BNSF's ballast specification, therefore, actually lists the acceptable ballast quarries to eliminate any inferior material being placed on its railroad.[113] Guernsey Stone is not listed as an acceptable quarry.

For the Shawnee to Walker project, and other recent projects on the Orin Line, BNSF purchased ballast from Granite Canyon, as shown on the Shawnee to Walker AFE[114] produced to WFA/Basin in discovery (BNSF/LR 22457). This can be further verified from another document that BNSF produced in discovery, "BALLAST 2002 THRU 2004.xls." That document shows that BNSF purchased only 576 tons of ballast from Guernsey out of the 10,000,000 tons purchased since the beginning of 2002, of which 570,000 tons came from Granite Canyon.[115]

Even if the Guernsey Stone ballast were acceptable, WFA/Basin's choice of that quarry for ballast is impractical. WFA/Basin purport to deliver ballast and subballast from the Guernsey Stone quarry along the LRR through the existing Guernsey Yard East and on to other locations

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[113] BNSF Reply electronic workpaper "Ballast Spec.pdf."

[114] BNSF Reply electronic workpaper "Ballast.pdf."

[115] BNSF Reply electronic workpaper "BALLAST 2002 THRU 2004.xls." BNSF also purchases ballast from Pipestone, Montana, but as the material price for ballast is higher from that source than from Granite Canyon and it is a further haul to Donkey Creek (463.1 miles) than from Granite Canyon, BNSF Engineering Consultants used only the Granite Canyon source for ballast.

on the LRR. The existing connection from the Guernsey quarry is at MP 94.1. The LRR continues to the east to MP 91.40. This would require the material to be transported 2.7 miles over a railroad line that does not exist. In past SAC cases, most recently *Xcel,* the Board has agreed that "it is not proper to assume that a SARR could transport material over the very line that the SARR would need to build."[116] Therefore, BNSF Engineering Consultants have used Granite Canyon as the source for ballast for the LRR.

(b) Subballast

WFA/Basin purport to obtain subballast from two locations – the same Guernsey Stone quarry from which they proposed to obtain ballast and a quarry in Moorcroft, WY. WFA/Basin assumed that the material from Guernsey would be delivered to Shawnee Jct. and the material from Moorcroft to Donkey Creek.[117] While there is a WFA/Basin workpaper that memorializes a December 2003 telephone quote from Guernsey Stone, there is nothing in WFA/Basin's workpapers identifying the Moorcroft source. Moreover, BNSF Engineering Consultants have not been able to locate any such quarry. As shown on the Shawnee to Walker AFE, BNSF used Guernsey "Fines" for subballast on that project.[118] However, for the logistical reasons discussed in the previous section, Guernsey cannot be the only source for subballast. Therefore, BNSF Engineering Consultants used Granite Canyon and Guernsey as sources for subballast, with the subballast from Guernsey being trucked to delivery points near Guernsey.

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[116] *Xcel II, slip op. at 18.*

[117] WFA/Basin Opening electronic workpaper "Ballast & subballast Worksheet.xls," worksheet "BALLAST UNIT COST."

[118] BNSF Reply electronic workpaper "Ballast.pdf."

(3) Ballast and Subballast Quantities

In their Opening Evidence, WFA/Basin provided drawings of standard track sections relying on AutoCAD 2004 software to determine the per linear foot quantities of ballast and subballast for these standard track cross-sections.[119] Although WFA/Basin constructed the LRR with only 24-foot roadbed widths, they actually calculated the ballast and subballast quantities for both the 24-foot and 28-foot roadbed widths for the various track section.[120] BNSF Engineering Consultants accept the per linear foot quantities for both roadbed widths. However, they take issue with WFA/Basin's calculation of ballast and subballast quantities because of certain errors WFA/Basin made in their calculations.

First, when WFA/Basin applied the per linear foot quantities to calculate ballast, they neglected to remove the volume of ties. BNSF Engineering Consultants have made this correction. Second, WFA/Basin double counted ballast and subballast quantities for the interchange, set-out and helper tracks. As seen in their electronic workpaper "Ballast & subballast Worksheet.xls," WFA/Basin included these tracks in the worksheets for "Four Tracks" and "Five Tracks" as well as in the worksheets for "Interchanges" and "Set Out and Helpers." WFA/Basin then added these tracks together to determine the ballast and subballast quantities. BNSF Engineering Consultants have corrected this error in their restatement.

BNSF Engineering Consultants have also adjusted the ballast quantities to reflect the additional four inches of ballast material required under the concrete tie, as shown in BNSF typical section.[121] As discussed in Section III.F.3.c below, consistent with BNSF's current

[119] WFA/Basin Opening Workpaper Vol. 10, pp. 05832-60 and 05882-3.

[120] WFA/Basin Opening electronic workpaper "Ballast & subballast Worksheet.xls," worksheets "Ballast and Subballast (xx)."

[121] BNSF Reply electronic workpaper "Ballast.pdf."

standards for new construction of high density, heavy axle loading, coal-hauling lines, BNSF Engineering Consultants constructed the LRR with concrete ties in those areas where BNSF currently has concrete ties. Overall, BNSF has concrete ties on 83% of the lines replicated by the LRR. As a result, there is a significant difference between BNSF's ballast quantity and that of WFA/Basin.

With respect to subballast quantities, WFA/Basin used a conversion factor of 3000 pounds of subballast is equal to one cubic yard of subballast or 1.5 tons equal one cubic yard. BNSF Engineering Consultants noticed when reviewing BNSF AFEs and other documents made available to WFA/Basin during discovery that when quantifying subballast, BNSF adds a compaction factor of between 40% and 44%. In BNSF's workpapers, there are AFEs from several BNSF projects that note that a compaction factor was added. For instance, on the Guernsey to Grattan second main and Guernsey R&D track projects, a 44% compaction factor is noted in the bid tabs, and Guernsey Stone is identified as the source. Also, for the north lead in Guernsey yard, a 40% factor was used.[122] Since both WFA/Basin and BNSF in this case are relying on actual data, BNSF Engineering Consultants note that the Shawnee to Walker estimate for a 2004 revision (BNSF/LR 22429) also includes a compaction factor for subballast.[123]

With this in mind, BNSF Engineering Consultant Ms. Gouger asked the BNSF Manager Engineering on this project, Jack Moy, about BNSF's conversion factor from CY of subballast to tons and was told that, based on BNSF experience, they use a factor of 1.94 to convert from CY

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[122] BNSF Reply electronic workpaper "Subballast Compaction.pdf."

[123] BNSF Reply electronic workpaper "Subballast Compaction.pdf."

to tons.[124] Therefore, BNSF Engineering Consultants used that conversion factor to determine the tons of subballast required for the LRR.

(4) Unit Costs

(a) Ballast

WFA/Basin developed a unit cost for ballast using a quote of ${ } for Guernsey stone, in Guernsey, WY taken from a "2002-3003 Meridian Price Lists.pdf" produced by BNSF in discovery.[125] WFA/Basin calculated the transportation component of this unit cost by multiplying (1) the mileage between the Guernsey Stone quarry and each of the three delivery points that they selected from the various railheads along the LRR, Guernsey, Shawnee and Donkey Creek, by (2) the per ton mile transportation additive of $0.035 applied by the Board in *WPL*.[126] WFA/Basin then developed a separate unit cost for ballast delivered to each of these locations, ${ } per cubic yard when delivered to Shawnee, ${ } when delivered to Donkey Creek, and ${ } when used at Guernsey, which WFA/Basin assumed carried no transportation costs.

As discussed above, material from Guernsey Stone is not acceptable for ballast on the heavy axle loading lines of the LRR. Therefore, BNSF Engineering Consultants developed their ballast unit cost based on sourcing ballast from Granite Canyon. They used a unit cost for the ballast material of ${ } taken from the Shawnee to Walker AFE (BNSF/LR 22481

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[124] BNSF Reply electronic workpaper "Subballast Compaction.pdf."

[125] WFA/Basin Opening Workpaper Vol. 10, p. 05881.

[126] WFA/Basin Opening electronic workpaper "Ballast and subballast Worksheet.xls," worksheets "BALLAST UNIT COST" and "Ballast Subballast Cost." WFA/Basin assumed a transportation cost of $0.00 from the Guernsey Quarry to the Guernsey railhead.

\${ }). The use of this unit price is consistent with WFA/Basin's use of actual real-world unit prices from Shawnee to Walker for grading.

As did WFA/Basin, BNSF Engineering Consultants developed a transportation additive based on the mileage to the various delivery points. BNSF Engineering Consultants took issue, however, with WFA/Basin's delivery of ballast to only three locations along the LRR because that approach fails to take into consideration the effort required to distribute ballast and subballast along the LRR as it is constructed. In order to undertake the simultaneous construction of track construction packages specified in WFA/Basin's construction schedule, ballast would have to be available at all construction sites.[127] Since the ballast cannot be distributed by rail over the LRR until the railroad is constructed, the only way WFA/Basin could construct the track laying packages simultaneously would be to transport the ballast by truck along the right of way from the WFA/Basin selected delivery points at Guernsey, Shawnee and Donkey Creek to the other construction sites along the LRR.[128] It is not reasonable to assume, nor has WFA/Basin demonstrated, that the Windgate quote, which includes distribution of materials, was premised on an understanding that distribution of the ballast and subballast would require trucking these materials from limited delivery points to other construction sites.

BNSF Engineering Consultants, therefore, deliver ballast from Granite Canyon by rail via UP to LRR railheads at Moba, Guernsey, Shawnee and Donkey Creek. BNSF Engineering Consultants have adjusted the ballast cost to reflect the transportation to these additional

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[127] WFA/Basin Opening electronic workpaper "Western Fuels Scheduling.pdf."

[128] BNSF Reply electronic workpaper "Ballast.pdf."

locations, applying WFA/Basin's methodology, outlined above.[129] The mileages to the LRR locations were taken from PC Miler.

When the transportation component of the ballast unit cost is restated to reflect delivery to the necessary number of railheads, the BNSF unit cost for ballast before indexing is { }.

(b) Subballast

In developing their unit costs for subballast, WFA/Basin purport to use quotes from two sources, one for ${ }/ton from Guernsey Stone, in Guernsey, WY and one for ${ }/ton from an unidentified source in Moorcroft, WY. WFA/Basin calculated a transportation additive to reflect delivery from Guernsey to Shawnee and from Moorcroft to Donkey Creek. There is no record of any quote from Moorcroft, but the ${ }/ton December 2003 unit cost from Guernsey Stone emerges as a 2003 quote from Moorcroft. Because BNSF Engineering Consultants have not been able to identify the Moorcroft quarry and verify this cost, they have relied instead upon the quarries from which BNSF actually receives subballast, *i.e.,* Guernsey Stone in Guernsey and Granite Canyon. The Shawnee to Walker AFE identifies the subballast used on that project as "Fines, Guernsey." Therefore, BNSF Engineering Consultants used the ${ } unit cost for subballast materials that originate from Guernsey that is shown in the Shawnee to Walker AFE (BNSF/LR 22467 ${ } NT). The unit cost for material from Granite Canyon was taken from the "2002-2003 Meridian Price Lists.pdf" produced in discovery. Since the material used on the Shawnee to Walker project was described as "fines," BNSF Engineering Consultants used the 2003 ${ } unit cost for Granite Canyon fines.

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[129] BNSF Reply electronic workpaper "Ballast & Subballast Worksheet.xls," worksheet "BALLAST UNIT COST."

As with ballast, BNSF Engineering Consultants take issue with the limitation of delivery to only two locations. Therefore, they provided delivery of subballast from Granite Canyon to Moba, Shawnee and Donkey Creek. The transportation additive for subballast from Granite Canyon was calculated in the same way as for ballast material.

When the transportation component of the subballast unit cost is restated to reflect delivery to the necessary number of railheads, the BNSF unit cost for subballast before indexing is ${ }.

WFA/Basin also independently determined the labor cost of placing subballast, using a per mile quote from Windgate Constructors.[130] As discussed in Section III.F.3.j below, while BNSF Engineering Consultants do not accept the Windgate quote for most of the track laying costs, they do accept it for subballast for the reasons explained in III.F.3.j.

c. Ties

(1) Tie Specifications

In their Opening Evidence, WFA/Basin included two types of wooden crossties for use in constructing the LRR. For mainline track, WFA/Basin proposed 7"x 9"x 8'- 6" Grade 5 ties, and for yard, setout and helper tracks, 6"x 8"x 8'- 6" Grade 3 ties. WFA/Basin use 20.5-inch spacing between ties, based on what they claim without citation is "consistent with railroad industry standards for heavy duty mainline track" and on the Board's acceptance of that standard in a 1996 decision in *WTU* with respect to an entirely different lighter density SARR on a different line. WFA/Basin Opening Nar. at III-F-61. The only industry standard relating to tie spacing

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[130] BNSF Engineering Consultants' discussion of the Windgate quote for all track installation costs appears in Section III.F.3.j.

that WFA/Basin include in their workpapers is the AREMA section that recommends spacing ties between 18 inches and 30 inches.[131]

WFA/Basin's 20.5-inch spacing does not reflect industry standard and certainly not the standard that BNSF and UP use for high density coal train traffic. BNSF's standard has long been to install wood ties at 19.5-inch centers. The Shawnee to Walker project Tie Materials Worksheet shows that BNSF installed 100 wood ties within the 163 feet between the last switch ties on No. 20 crossovers. This equates to 19.5-inch spacing.[132] Also, Union Pacific's presentation on standards for heavy axle loading lines given to the STB during its August 2004 PRB inspection trip included the updated standards used for new construction on the PRB coal lines. The standards for ties, specifically "Larger Tie Size and Closer Spacing" specified 19.5-inch spacing for wood ties on heavy haul sections; for concrete ties it specified 9" x11" x 8'6" prestressed concrete ties at 24-inch spacing.[133] The document further states that the standard for spiking and anchoring is four spikes per tie plate and box anchoring almost every tie.[134] Based on the standard for HAL coal traffic lines in the PRB, BNSF Engineering Consultants have used the UP and BNSF standard 19.5-inch spacing for wood ties on mainline tangent track.

BNSF has over the past several years been specifying the use of concrete ties for the high density, heavy axle loading (coal unit train) lines. Its most recent standards call for concrete ties on 141-pound rail. BNSF began switching to concrete ties as early as the 1980s and upgraded the construction on the Orin Line to concrete ties and 136-pound rail (as opposed to the original

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[131] WFA/Basin Opening electronic workpaper Vol. 10, p. 05888.

[132] BNSF Reply electronic workpaper "Ties.pdf."

[133] "Strengthening the Railroad to Accommodate HAL Traffic" at p. 15, included in BNSF Reply electronic workpaper "Ties.pdf."

[134] *Id.*

132-pound rail) during the late 1980s and the 1990s. Today, most of the Orin Line replicated by the LRR has concrete ties. Therefore, BNSF Engineering Consultants have used concrete ties on the portions of the LRR where BNSF has concrete ties today. BNSF uses concrete ties in all curves because the concrete ties are better able to withstand the centrifugal forces in the curves. In addition, BNSF has been using concrete ties in new construction and where additional strength is needed has replaced wood ties with the new concrete ties. At present, 83 percent of the ties on the lines replicated by the LRR are concrete. BNSF Engineering Consultants have been able to identify from the track charts the mainline miles of LRR line segments that have been equipped with concrete ties and developed for each LRR subdivision the percentage of total ties that are concrete, as shown in the table below.[135]

Table III.F.3-2
Concrete v. Wood Ties on LRR

LRR Subdivision	Concrete	Wood
Black Hills	19%	81%
Campbell	100%	0%
Canyon	83%	17%
Front Range	34%	66%
Orin	90%	10%
Reno	13%	87%
Total	**83%**	**17%**

BNSF Engineering Consultants have applied the subdivision percentages to determine the quantities of concrete and wood ties for each subdivision on the LRR. It was assumed that mine spurs are constructed with wood ties. Consistent with BNSF and UP standards, BNSF Engineering Consultants use 24-inch spacing on concrete ties.

[135] BNSF Reply electronic workpaper "III F 3 Ties.xls" represents the ties that currently exist on the BNSF lines being replicated by the LRR.

For those areas where wood ties are used on mainline tangent track, BNSF Engineering Consultants accept WFA/Basin's specification for 7"x 9"x 8'- 6" crossties. BNSF also accepts WFA/Basin's use of Grade 3 ties at 24-inch spacing for yard, setout and helper tracks. The Grade 3 ties adequately support the track and distribute the train loading of slower moving trains in yards to the ballast and subballast sections.

(2) Tie Quantities

BNSF's tie quantities are significantly different from WFA/Basin's estimates. First, as discussed in the previous section, BNSF Engineering Consultants reject WFA/Basin's use of 20.5-inch spacing on mainline tangent track and therefore also reject their conversion factor of 3,091 ties per mile. BNSF's restated wood tie quantities are based on a conversion factor of 3,249 ties per mile for Grade 5 ties on mainline tracks. For Grade 3 ties, BNSF Engineering Consultants accept 2,640 ties per mile at the 24-inch spacing.[136] Second, BNSF Engineering Consultants used concrete ties spaced at 24 inches on the large proportion of the LRR. For concrete ties, BNSF Engineering Consultants used a conversion factor of 2,640 ties per mile.

(3) Unit Costs

WFA/Basin's unit cost for mainline Grade 5 ties was taken from 2005 RS Means.[137] However, their $39.00 unit cost includes only the 2005 RS Means material portion of the total unit cost. WFA/Basin state on page III-F-62 of their Opening Narrative that "WFA/Basin's engineers excluded the overhead and profit portion of the tie cost, as such profits are already captured by the LRR's track installation contractor who is responsible for placing the ties." This is incorrect. The RS Means explanation of additives states that 10 percent profit should be added

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[136] WFA/Basin Opening electronic workpaper "Ballast & subballast Worksheet.xls."

[137] WFA/Basin Opening electronic workpaper "Ties1.pdf."

to the bare material cost.[138] This 10 percent is the profit that the supplier makes on the material. It has nothing to do with the placing of the tie, for which Means has a separate overhead and profit adjustment. Since WFA/Basin are providing the ties, they will be responsible for paying the supplier's profit. BNSF Engineering Consultants therefore have added the 10 percent to the tie material for a restated unit cost of $42.90 before indexing. As noted above, BNSF has corrected the indexing on WFA/Basin's track component unit costs.

WFA/Basin cite a 2003 price quote from Kopper Industries as the source for their unit cost for yard, set-out and helper track crossties.[139] The Koppers quote for the 6"x 8"x 8' - 6" tie showed a delivered price of $27.05 each to Gillette from the Galesburg, Illinois plant. BNSF Engineering Consultants accept that unit price, correctly indexed to $30.23.

BNSF Engineering Consultants obtained a unit cost for concrete ties of ${ } from BNSF AFE A040738, which is the AFE for the Shawnee to Walker third main project.[140] The document also provides unit costs for the tie pad (${ }), clips (${ }) and insulators (${ }) used with concrete ties. Concrete ties require two pads with two clips and two insulators for each pad. Transportation costs for the concrete ties were developed based on delivery from Denver, Colorado, to Donkey Creek, Shawnee Jct., Moba Jct. and Guernsey, Wyoming.[141]

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[138] 2004 RS Means Heavy Construction Handbook, p. 3 included in BNSF Reply electronic workpaper "Ties.pdf."

[139] WFA/Basin Opening Workpaper Vol. 21, pp. 10770-1.

[140] BNSF Reply electronic workpaper "Tie.pdf."

[141] BNSF Reply electronic workpaper "III F LRR Construction.xls," worksheet "Tie Unit Price."

(4) Transition Ties

WFA/Basin's engineers have deliberately excluded transition ties because "not all railroads use transition ties and BNSF does not always use them." WFA/Basin Opening Nar. at III-F-63. This is another example of ignoring the actual construction standards to which real-world coal-hauling railroads construct their lines in order to achieve lower costs. The use of transition ties in areas such as road crossings and turnouts is well documented in BNSF standards.[142] Because of the transition from a flexible track structure to a rigid one, the additional tie length is required to insure stability and minimize wear of materials at these locations. To avoid having to purchase and stock several tie sizes, railroads typically use a standard transition tie that can be installed in multiple settings. The BNSF standard is to use a series of ten 10'x 7"x 9" wood ties ahead of each turnout point of switch and at road crossings where additional support for the track and for the crossing materials is required. The longer ties at highway crossings spread the load and allow the use of wider crossing surface materials that better withstand the highway traffic loads. Accordingly, BNSF Engineering Consultants have placed transition ties at turnouts and road crossings. The unit cost of ${ } for transition ties is taken from BNSF AFE 046035 provided in discovery.[143] BNSF Engineering Consultants have also adjusted the transportation component of this cost to reflect changes made to LRR railheads as discussed in Section III.F.3.i.

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[142] Sample BNSF standards for transition ties at turnouts are included in BNSF Reply electronic workpaper "Transition Ties.pdf."

[143] BNSF Reply electronic workpaper "Transition Ties.pdf," originally produced as "A046035.pdf."

d. Rail

(1) Specifications

In their Opening Narrative, WFA/Basin specified the use of 136-pound CWR for LRR mainline track, with premium rail used between Donkey Creek and Guernsey and in other areas on curves 3 degrees and greater. WFA/Basin acknowledges that 141-pound rail has "increased in popularity," but eschews this standard because ". . . high density mainline tracks such as BNSF's Panhandle Subdivision double-track project on its Transcontinental line are still being laid with 136 pound standard rail on tangents (141 pound is used on curves)." WFA/Basin Opening Nar. at III-F-63. Comparing the Panhandle, which is mostly intermodal traffic, to the heavy axle loads of the LRR is inappropriate. Although the Panhandle route does experience high traffic density, it is not comparable to the high-density and heavy axle loading combination that exists on the Orin Subdivision. It is the combination of the high volumes and perpetual repetitive impact of heavily loaded continuously cycling unit trains that demands the higher standards of construction.

BNSF has just recently begun constructing new capacity with 141-pound rail (e.g., Shawnee to Walker) on tangents, but it has been replacing rail in curves with 141-pound rail since 2002 on the Orin Subdivision. A review of current track charts shows that 22.3 track miles of 141-pound rail exists today on the BNSF segments replicated by the LRR. As shown in BNSF Reply electronic workpaper "III F 3 Rail.xls," the 141-pound rail is typically used in curves, varying from one-half to over five degrees. WFA/Basin thus choose a lower standard than what experience has taught BNSF and UP is necessary for new high density coal-hauling rail lines being built today.

As Mr. Boileau points out, in the real world, a new railroad or any railroad constructing a new coal line in the PRB would build it to the upgraded standards that BNSF and UP have adopted through years of experience and field testing. Nevertheless, to be conservative, as with the concrete ties, BNSF Engineering Consultants have constructed LRR lines to the new standards only in those places where they already have been implemented by BNSF. As BNSF uses 141-pound premium rail in curves, BNSF Engineering Consultants have followed that standard on the LRR.

BNSF, however, does not use premium rail on tangents because its vast experience over the years has shown that the use of premium rail on tangents does not significantly reduce the rail grinding frequencies. Because of the continuous pounding by unit trains of up to 135 cars loaded on average to 286,000 pounds per car, there is a tremendous impact on the rail even when premium rail is used. Therefore, BNSF uses 141-pound premium rail only in curves, where it has found that the use of the hardened rail does make a significant improvement. Moreover, BNSF's standard for use of 141-pound standard rail on tangents has been implemented only on the Shawnee to Walker third main project which is not being replicated by the LRR. Therefore, consistent with BNSF's current standards, BNSF Engineering Consultants have constructed the LRR with 136-pound standard rail on mainline tangents.

For yard, interchange and set-out tracks, WFA/Basin use second hand 115-pound CWR rail. BNSF accepts this specification.

(2) Quantities

(a) Mainline Track

WFA/Basin calculated rail quantities assuming a 1,440-foot length, which is the standard manufacturer length for rails,[144] and BNSF also has used this length in determining its restated rail quantities. However, in determining their rail quantities, WFA/Basin have made several

[144] WFA/Basin Opening electronic workpaper "Track Quantities.xls."

errors and/or inappropriate adjustments to their rail quantities for crossovers and curves, as discussed in detail in the subsections below.

(i) Crossovers

WFA/Basin removed from their calculation of rail quantities, the lengths of rail in all turnouts on the LRR, including turnouts in crossovers.[145] BNSF Engineering Consultants agree that the rail lengths on branch lines and sidings should be calculated without the rail lengths in the turnouts to those lines because the turnouts are laid at the same time as the branch line or siding is laid. Thus, when the rail lengths for the branch lines and sidings are calculated on the basis of the distances between mileposts, the rail lengths are overstated as they include the rail in the turnouts. With crossovers between mainline tracks, as opposed to turnouts to branch lines or sidings, there generally is no overstatement of rail lengths because for crossovers on 15-foot track centers, the two turnouts generally are the extent of the rail needed. There is no additional rail length between the ends of the turnouts and thus no calculation of rail lengths from which to subtract the rail lengths in the turnouts.

However, as discussed in more detail below, for crossovers between mainline tracks with 25-foot centers, there is additional rail between the end points of the turnouts, and therefore WFA/Basin should have included that additional rail into their rail length calculations -- but they did not. As they did not include any additional rail quantities for crossovers, their proposed adjustment to remove the lengths of rail in the turnouts is inappropriate.

In their restatement of rail quantities, BNSF Engineering Consultants therefore (1) remove only the lengths of rail in non-crossover turnouts from the rail quantities as shown in

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[145] WFA/Basin's Opening electronic workpaper "Rail Worksheet.xls," worksheet "Rail Cost Summary."

BNSF Reply electronic workpaper "III F LRR Construction.xls," worksheet "Rail," and (2) add in the lengths of rail between the ends of the turnouts on crossovers on mainline tracks with 25-foot centers, which as shown below is 162 feet.

BNSF's Turnout Geometry Charts[146] show the length of additional rail that is required for crossovers on 25-foot centers. As can be seen from the diagram and chart, a No. 20 crossover on 25-foot centers requires an additional 162 feet of rail. This is confirmed by the Shawnee to Walker project files made available to complainants during discovery.[147] The tracks in the Shawnee to Walker third main project were constructed on 25-foot centers. The Rail Information worksheet shows that BNSF added 190 additional feet of rail to each No. 20 crossover to account for 25-foot track centers.[148] The Tie Material worksheet shows that the distance between turnouts ("Track Feet Between Last Switch Ties") was 163 feet, thus requiring 100 additional ties with 19.5-inch spacing.[149] The 163 feet on the tie workpaper is consistent with the requirement of an additional 162 feet of rail calculated from the BNSF diagram for No. 20 crossovers on 25-foot track centers. The rail in excess of 163 feet that BNSF added appears to have been a cushion to avoid being short on rail. In their restatement of rail quantities, BNSF Engineering Consultants have used the BNSF standard of 162 additional feet of rail for each No. 20 crossover on 25-foot centers.

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[146] BNSF Reply electronic workpaper "Rail Quantities.pdf."

[147] BNSF Reply electronic workpaper "Rail Quantities.pdf."

[148] BNSF Reply electronic workpaper "Rail Quantities.pdf."

[149] BNSF Reply electronic workpaper "Rail Quantities.pdf."

WFA/Basin also neglected to build one crossover that was included in their RTC model -- the crossover at MP 14.2 on the Orin Subdivision.[150] BNSF Engineering Consultants have added the turnouts and rail lengths for that crossover to their restated quantities.

(ii) Curves

WFA/Basin's rail quantities are also understated because of an error in their calculation of rail lengths on curves. WFA/Basin's curve inventory was so incomprehensible that BNSF Engineering Consultants had to revert to the original BNSF inventory produced in discovery and create a new LRR curve inventory before they could analyze what WFA/Basin had done. They discovered that some of WFA/Basin's track numbers were incorrect and that the mileposts in the WFA/Basin inventory were completely different from those in the original inventory -- although WFA/Basin did not use the milepost numbers in determining the curve lengths. BNSF further discovered that WFA/Basin actually removed all spiral information from the curve inventory.

Spirals are rail lengths whose degree of curve goes from infinity (tangent) to the degree of the body curve. They are used to gradually introduce the superelevation of the curve as well as to guide the train from tangent track to curved track. As explained in the 2003 AREMA *Practical Guide to Railway Engineering*, as a rail vehicle traverses a curve, it transmits a centrifugal force to the rail at the point of wheel contact, which could cause derailment. This centrifugal force is countered by the application of superelevation (or banking) which effectively raises the outside of the rail in the curve by rotating the track structure about the inside rail. The transition between tangent level track and curved superelevated track is established by the use of a spiral. Without the spiral, there would be a very high lateral dynamic loading acting on the

[150] BNSF Reply electronic workpaper "Rail Quantities.pdf."

first portion of the curve and the first portion of the tangent past the curve due to the sudden introduction and removal of centrifugal forces associated with the body curve.[151]

WFA/Basin inexplicably removed the spirals when calculating their curve lengths. The spiral length typically begins halfway into the tangent and ends halfway into the actual curve. Therefore, when WFA/Basin remove the spiral lengths, a portion of the curve would no longer be superelevated. As a result, that portion would be built to a tangent track standard rather than to the standard that WFA/Basin specified for curves. WFA/Basin's specifications call for (1) Pandrol plates on all curves 3 degrees or greater; (2) premium rail on curves 3 degrees or greater on the Reno, Campbell and Front Range Subdivisions; and (3) adjustments to ballast on curves 3 to 5 degrees and greater than 5 degrees. Thus, by removing the spirals, WFA/Basin built the curves on the LRR to a lesser standard than they specified. Correcting that error requires adjustments not only to WFA/Basin's rail quantities, but also to their quantities of ballast and Pandrol plates and clips.

However, as discussed above, BNSF Engineering Consultants construct the LRR with 141-pound premium rail on concrete ties in all curves. The use of concrete ties means that there will be no need for Pandrol plates and clips on the LRR as concrete ties require a special, more secure fastening device. Thus, on Reply, BNSF Engineering Consultants have adjusted the rail lengths to include the spirals and replaced the Pandrol plates and clips with the tie pads, clips and insulators required on concrete ties.

There is another discrepancy in WFA/Basin's curve data. In their Errata, WFA/Basin submitted a revised curve spreadsheet "Curve Data Worksheet.xls" to correct a sorting error that

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[151] 2003 AREMA *Practical Guide to Railway Engineering*, Chapter 6 – Railway Track Design at pp. 223-224, included in BNSF Reply electronic workpaper "Curves.pdf."

they discovered in their Opening spreadsheet. According to WFA/Basin, the corrected spreadsheet resulted in a decrease from 70 to 54 in the number of rail lubricators required on tracks with curves over 3 degrees. BNSF Engineering Consultants agree with the corrected number of lubricators, but note that the resorted file does not link the spreadsheet to other rail quantities. As a result, the updated spreadsheet does not provide useful information regarding other track component quantities related to curves.

BNSF Engineering Consultants identified additional errors in WFA/Basin's curve evidence. First, WFA/Basin constructed *all* curves with 136-pound premium rail, even though their standard specified premium rail only on curves of 3 degrees or greater. BNSF uses 141-pound premium rail in curves of 3 degrees or greater and 136-pound standard rail in all other curves. Second, WFA/Basin identified only 219 curves on the LRR, whereas BNSF Engineering Consultants – using their new inventory – identified 222 curves.

As noted above, to overcome the multiple deficiencies in WFA/Basin's Opening evidence on curves, BNSF Engineering Consultants created a new LRR curve inventory and a new curve worksheet to compute the quantities of rail and other track components on curves.[152]

(b) Yard Tracks

BNSF witnesses Mueller and Wheeler evaluated WFA/Basin's yard configurations at Guernsey, Donkey Creek, and South Logan and determined that the yards were sufficient to handle the LRR traffic. BNSF Engineering Consultants made only minor changes to the tracks in Guernsey Yard. They added 0.68 miles as a result of an adjustment of the mechanical yard tracks near the locomotive shop. BNSF's yard rail quantity calculations reflect this minor

[152] BNSF Reply electronic workpaper "III F LRR Construction.xls," worksheet "Curves."

adjustment.[153] In all, BNSF has constructed the LRR with a total 42.38 miles of yard track. *See* BNSF Reply Table III.B-2.

(c) Interchange Tracks

WFA/Basin state that the LRR will interchange traffic with BNSF at Campbell, Donkey Creek, Orin Jct., Guernsey and Moba Jct. WFA/Basin Opening Nar. at III-B-2. BNSF capacity witnesses Mueller and Wheeler evaluated WFA/Basin's interchange facilities and determined that they were adequate.

(d) Set-Out Tracks

WFA/Basin construct set-out tracks of 860 feet. In their Opening Narrative at page III-B-8, WFA/Basin explain that the set-out tracks are "860 feet in length between switches" which provides "600 feet of length in the clear." BNSF Engineering Consultants requested support for WFA/Basin's calculation of 860 feet between switches. In response, WFA/Basin provided a lengthy discussion of the 10:1 ratio (No. 10 turnout) from the Point of Intersection of Turnout (PITO) to a 13-foot clearance point to get to the 130 feet (10*13) on either end of the 600 feet in the clear. BNSF Engineering Consultants agree that the length from the PITO to the 13-foot clearance point is 130 feet. However, there is an additional distance from the PITO to the Point of Switch that WFA/Basin have not taken into consideration. This distance is shown in a table on the Union Pacific standard drawing for a No. 10 turnout, which is included in BNSF Reply electronic workpaper "Rail Quantities.pdf." Column D of the "Table of Variable Dimensions Based on Track Centers (A)" gives the distance from Point of Switch to the 13-foot clearance for various track center spacings ranging from 13 feet to 20 feet. Although the table does not include 25-foot track centers, column D shows that the distance becomes a constant 162.48 feet

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[153] BNSF Reply electronic workpaper "III F LRR Construction.xls," worksheet "Rail."

when the track centers become greater than 17 feet. Therefore, based on this table, a minimum of 162.48 feet would be required, not 130 feet. The correct distance "between switches" therefore is 925 feet (162.48' + 600' + 162.48').

WFA/Basin stated that they intend to have the set-out tracks double as temporary storage tracks for maintenance-of-way equipment. WFA/Basin Opening Nar. at III-B-8. However, although WFA/Basin have built the setouts as double-ended, they did not include sufficient length to accommodate the dual purposes of holding bad-order cars and MOW equipment. Therefore, BNSF Engineering Consultants have constructed one of the two setouts around each FED with an additional 1,400 feet, the length of track needed to accommodate large pieces of maintenance equipment, including ballast trains, welded rail delivery and pick-up trains, and other large production surfacing gang equipment consists.[154] Ballast and rail trains can easily reach 1,400 feet in length, and all of this equipment must clear the main tracks and operating sidings to avoid delaying trains or reducing capacity on the line. Under the BNSF configuration with elongated sidings, both the operating and maintenance needs will be efficiently accommodated.

In their restatement, BNSF Engineering Consultants have constructed two set-out tracks at each FED -- one at a length of 925 feet, and one at 2,000 feet to accommodate the maintenance-of-way equipment. BNSF Engineering Consultant Ms Gouger also determined that additional shorter set-out tracks were needed to accommodate the additional Dragging Equipment Detectors (DED) that are required on concrete ties. Concrete ties require that DEDs

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[154] As explained in Mr. Albin's discussion of maintenance-of-way issues in Section III.D.4, it is important to have maintenance equipment stored close by. However, the equipment needs to be kept off the mainline to minimize disruptions to traffic flows. This requires the construction of maintenance-of-way tracks sufficient to accommodate the longest MOW equipment.

be spaced every five miles. Therefore, in addition to the FEDs (combined DED and Hot Bearing Detectors), there will be 45 additional DEDs, each with one set-out track of 300-feet (including the turnout) -- just long enough for two cars to be set out.[155]

(3) Unit Costs

WFA/Basin cherry picked their unit costs for the types of rail on the LRR and misrepresented the costs in their evidence. In their Opening Narrative, WFA/Basin state that "the delivered costs for 136 pound premium and 136 pound standard rail were based on price lists provided by BNSF in discovery, with transportation added as required to various railheads." WFA/Basin Opening Nar. at III-F-64. There are two problems with WFA/Basin's use of the BNSF materials price list. First, WFA/Basin used a BNSF supplied price list dated January 1, 2004 as its basis for 2004 rail costs when in fact the price list reflected 2003 prices that had not yet been updated. BNSF updates its price lists for the current year in the first quarter of the year to reflect changes over the past year. The price list provided as of January 1, 2004, therefore reflects the unadjusted 2003 prices.

This can easily be verified through other information provided to WFA/Basin, particularly the 2003 and 2004 AFEs that WFA/Basin used for other unit prices for the LRR. The 2004 AFE rail prices,[156] which come from the BNSF price lists, correspond to the prices shown in BNSF's rail update information (BNSF Reply electronic workpaper "III F 3 Rail Unit Price.xls") and not with the unadjusted prices in the price list dated January 1, 2004.

Interestingly, rail is the only category of track materials where WFA/Basin used the price list instead of the actual AFEs or supplier quotes. If WFA/Basin had solicited 2004 quotes from

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[155] FEDs and DEDs are discussed in Section III.F.6.a.(2).

[156] BNSF Reply electronic workpaper "Rail Unit Prices.pdf."

rail suppliers, as they did for other track items, they would have found that the lowest rail price was that found in the BNSF price list reflecting unadjusted 2003 prices. As can be seen in the spreadsheet, there was a significant price increase in rail during 2003 as a result of increased steel prices. That increase was not reflected in the BNSF price list until BNSF updated its price list in the first quarter 2004.

WFA/Basin's use of an incorrect rail price is not sufficiently addressed by WFA/Basin's indexing because WFA/Basin treated the cost as a 2004 cost and incorrectly indexed it to October 2004. BNSF Engineering Consultants use the updated BNSF rail prices set out in "III F 3 Rail Unit Prices.xls" in their restatement of rail costs. The differences in unit costs for the three rail types used by WFA/Basin on the LRR are set out in the table below.

Table III.F.3-3
Comparison of WFA/Basin and BNSF Rail Unit Costs

Rail Type	WFA/Basin Opening	BNSF Reply	Difference
115# SH	${ }	${ }	${ }
136# Standard	${ }	${ }	${ }
136# Premium	${ }	${ }[157]	${ }

Moreover, WFA/Basin's rail costs do not adequately address transportation costs because the delivered costs used by WFA/Basin are to limited destinations. For example, WFA/Basin supply the rail from two sources, Laurel and Pueblo. WFA/Basin obtain 136-pound premium rail and 115-pound second hand rail from the Laurel source, which delivers to only two destinations, Campbell and Orin Jct. WFA/Basin obtain 136-pound standard rail from Pueblo,

[157] The lower increase for premium rail in BNSF's updated price list is a function of BNSF's price adjustment which takes into account how much rail will be needed and how much is already on hand. BNSF's lower price for premium rail reflects that BNSF had a greater quantity of premium rail on hand vis-a-vis its projected need for the year compared to the quantity of standard rail on hand vis-a-vis its projected need for that type of rail.

which delivers to two other destinations, Moba Jct. and Donkey Creek. There is no provision for the transportation of the various rail types to all railheads on the LRR. The Windgate quote clearly does not contemplate transporting second hand rail delivered to Orin Jct. all the way to the Guernsey Yard location. The distribution of the nearly 27 track miles of secondhand rail needed for construction of that yard could not be accomplished by rail until the completion of the construction of the 41.81 track miles between Orin Jct. and Guernsey. Since WFA/Basin are delivering the rail in 1,440 foot strings, highway transportation is not a realistic, or even possible, option. Moreover, WFA/Basin's premium rail also is delivered to Orin, but not to Guernsey, which means that the premium rail that WFA/Basin specify for mainline track construction could be distributed to other railheads only as the line is being built. These limitations, in the real world, would make it impossible to meet the construction schedule proposed by WFA/Basin.

The only reason that WFA/Basin limit delivery of materials to two locations is to minimize their transportation costs. But in doing so, they entirely ignore the impact on their construction schedule, just as they did with the distribution of ballast as discussed in Section III.F.3.b. above. This is another example of why SARR costs proposed by complainants do not reflect realistic costs for rail construction. They are "feasible" only in the hypothetical world, because there is no correlation between the least cost options selected and their impact on the overall project.

BNSF Engineering Consultants have included costs to deliver all types of rail to all rail accessible points on the LRR. BNSF treats Campbell and Donkey Creek as the same location, and also delivers rail to railheads at Orin/Bridger Jct., Moba Jct. and Guernsey. PC Miler[158] was used to determine the rail distances between the origins and railheads. The transportation

[158] BNSF Reply electronic workpaper "Rail Unit Prices.pdf."

calculations are included in BNSF's Reply electronic workpaper "III F LRR Construction.xls," worksheet "Rail Unit Price."

BNSF Engineering Consultants obtained the unit cost for 141-pound premium rail from BNSF's updated 2004 price list discussed above and included in BNSF's electronic workpaper "III F 3 Rail Unit Prices.xls." The unit price is \${ } per LF. The rail will be delivered from Pueblo, CO, to the various railheads, with the cost adjusted to reflect the transportation costs.

e. Field Welds/Compromise Welds

In their Opening Evidence, WFA/Basin state that they included the costs of materials used to weld rail joints as the rail is laid, as well as the costs for compromise welds that are needed at locations where the rail changes from 115-pound to 136-pound rail. WFA/Basin Opening Nar. at III-F-64 to 65. BNSF Engineering Consultants accept the field welds and compromise welds.

As quarter-mile sections of rail are laid on the ties, they must be welded together to provide continuous welded rail—*i.e.,* rail without joints. If the joints are not welded, they quickly become battered and chipped, which could result in broken rails in heavy tonnage areas. WFA/Basin included field welds based on a rail length of 1,440 feet and used a material unit cost taken from five BNSF AFEs of { } per weld kit.[159] BNSF accepts that unit cost.[160]

Where WFA/Basin's specifications called for the rail to change from 115-pound to 136-pound rail, WFA/Basin included compromise welds to join the two different rail sections. BNSF accepts the use of compromise welds, but its quantity is higher because each of the additional set-out tracks for DEDs requires welds. Also, WFA/Basin included only two compromise welds

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[159] WFA/Basin Opening electronic workpaper "Weld Kits BNSF/LR.pdf."

[160] BNSF Reply electronic workpaper "III F LRR Construction.xls," worksheet "Total Cost."

for each yard turnout. This is inadequate because WFA/Basin construct the yard turnouts with 136-pound rail and the rail in the yard with 115-pound rail, therefore requiring six welds per yard turnout. BNSF's restated quantity reflects this adjustment.

WFA/Basin used a 2003 Marta Track Constructors bid for a rail installation project that included a cost to supply and install 22 compromise welds at $450 per weld. BNSF accepts that cost.

f. Insulated Joints

WFA/Basin included their quantity of insulated joints in their signal costs, but discussed the unit cost under section III.F.3. Therefore, BNSF Engineering Consultants have done the same. WFA/Basin used a 2004 quote from LB Foster for bonded insulated joints, which BNSF accepts. For installation of the joints, WFA/Basin relied on a quote included in the Windgate Contactors quote for all track labor on the LRR. While BNSF Engineering Consultants do not use the Windgate quote for all track labor, because actual costs BNSF used for track labor did not provide sufficient information to develop a unit cost for installation of insulated joints, BNSF Engineering Consultants use WFA/Basin's cost of $1,500 per insulated joint.

g. Switches (Turnouts)

(1) Turnout Specifications

WFA/Basin proposed a mixture of standard AREMA design turnouts for use on the LRR. They used No. 10 manual turnouts for set-out tracks and many of the slow speed areas within yards and terminals. For many of the lighter density mainline segments, interchanges, and yards where speeds are moderate, WFA/Basin specified No. 14 turnouts. For mainlines on the heavier density segments, No. 20 turnouts were proposed. The No. 14 and No. 20 turnouts are powered. BNSF Engineering Consultants agree with WFA/Basin's selection of the turnouts for the LRR.

(2) Quantities

WFA/Basin determined the amount of turnouts needed on the LRR by connecting their track diagram (WFA/Basin Opening Exhibit III-B-2) Autocad files to an Excel spreadsheet, which then automatically calculates the number of each size turnout. WFA/Basin Opening Nar. at III-F-65 to 66. BNSF Engineering Consultants evaluated WFA/Basin's quantities of turnouts and determined that they underestimated the No. 10 turnouts by four and the No. 20 turnouts by seven based on their track configuration. Also, based on BNSF witnesses' minor adjustments to the LRR track structure, BNSF Engineering Consultants determined that the LLR required five No. 10 turnouts in the Guernsey yard and three more No. 20 turnouts, one at Nacco Jct. and two for the crossover that WFA/Basin neglected to construct. Also, a No. 10 turnout was added for each of the 45 additional set-out tracks that BNSF Engineering Consultants added for the DEDs required on concrete ties. Finally, BNSF Engineering Consultants discovered an error in WFA/Basin's construction of the line interchange at Orin Jct. WFA/Basin constructed the interchange with three No. 10 power and one No. 14 power turnouts, whereas all other interchanges were constructed with all No. 14 power turnouts. BNSF has corrected that error by using all No. 14 power turnouts on the Orin Jct. interchange. The changes made to the configuration of the LRR are shown in BNSF Exhibit III.B-1.

(3) Unit Costs

WFA/Basin's prices for each size turnout were developed from a quote by Koppers Industries, which included transportation to Pueblo, CO, Vernon, TX and Gillette, WY.[161] BNSF Engineering Consultants accept the materials unit costs and delivery to Gillette, but as with other track components discussed above, WFA/Basin have not taken into consideration the

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[161] WFA/Basin Opening electronic workpaper "Turnouts2.pdf."

impact of limiting delivery – in this case to only one railhead -- would have on their overall schedule.

WFA/Basin developed a separate cost for labor based on a quote from the Windgate Constructors.[162] As discussed in Section III.F.3.j, BNSF Engineering Consultants have developed a per track mile cost for the installation of turnouts based on actual costs for a contract project for BNSF Intermodal yard in Joliet, Illinois. BNSF has used that cost, rather than the Windgate quote, as a more appropriate cost for the LRR.

(4) Additional Turnout Components

WFA/Basin provided switch heaters for all mainline switches on the LRR.[163] WFA/Basin developed the material price from an independent quote from the Railway Equipment Company located in Delano, Minnesota.[164] The supplier provided a price for the switch heater complete with propane kit and snow detector, and a separate price for delivery to Gillette, Wyoming. BNSF Engineering Consultants accept the unit cost for the switch heater.

WFA/Basin rely on a quote from Windgate Constructors for the installation of switch heaters. For the same reason stated in III.F.3.f above, BNSF Engineering consultants use WFA/Basin's installation price of $1,300 per switch heater.

WFA/Basin developed a unit cost for a propane tank to fuel switch heaters, and included one propane tank for each switch heater they placed along the LRR.[165] BNSF's quantity for

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[162] WFA/Basin Opening electronic workpaper "Windgate Track Construction.pdf."

[163] WFA/Basin Opening electronic workpaper "Track Quantities.xls."

[164] WFA/Basin Opening electronic workpaper "III - F TOTAL.xls," worksheet "Material Unit Cost."

[165] WFA/Basin Opening electronic workpaper "Track Quanties.xls".

propane tanks is greater than WFA/Basin's estimate because of the additional switches that BNSF installed.

WFA/Basin's unit price for propane tanks was based on a quote from Elkhorn Propane, which BNSF Engineering Consultants accept.[166]

(5) Switch Stands

WFA/Basin's Opening Narrative did not contain any discussion of switch stands, though WFA/Basin did include costs for low target switch stands on all No. 10 turnouts and developed a unit cost for power switch machines that they include in their signal costs. BNSF agrees with using low target switch stands for all manual No. 10 turnouts.[167] As described in III.F.6.a, BNSF also agrees with the unit cost for powered switch machines and applies that cost to its updated quantity of powered switches.

WFA/Basin obtained quotes from various suppliers for both powered switch machines and low target hand thrown switch stands.[168] The quote from National Trackwork, from which WFA/Basin developed their powered switch machine unit cost, also included prices for manual switch stands and the adjustable connecting rod, the target and target mast, but WFA/Basin did not include costs for those latter items. WFA/Basin used only the quote for the powered switch machine, which they state in workpaper "III - F TOTAL.xls" is included in their signal costs. For the hand thrown switch stands, WFA/Basin used a quote from A&K for low target switch stands.

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[166] WFA/Basin Opening electronic workpaper "III - F TOTAL.xls," worksheet "Material Unit Cost."

[167] The costs for powered switch machines are included in Section III.F.6.a Signals, while hand-thrown switch stand costs are included in the Section III.F.3 totals.

[168] WFA/Basin Opening electronic workpaper "Switch Stands Powered.pdf."

BNSF Engineering Consultants accept WFA/Basin's unit costs for the powered switch machines and low target switch stands. BNSF Engineering Consultants also accept the prices from National Trackwork for the target and target mast delivered to Gillette and have added these costs to the low target switch stands where they have been placed along the LRR. The target and post are essential components of the low target switch stands, as demonstrated by BNSF specifications.[169]

(6) Generators

WFA/Basin provides a January 2004 material unit cost for two sizes of generators but neglects to install them on the LRR. BNSF installs generators at switch heater locations along the coal route in order to ensure that, in case of power outages, the switches will be clear of snow and ice that would otherwise cause disruptions to rail operations. Since the LRR carries large volumes of coal, and trainsit times for those volumes are of the utmost importance, BNSF Engineering Consultants have installed generators along the entire LRR. BNSF accepts WFA/Basin's material unit costs from Interstate Power Systems, but disagrees with WFA/Basin's application of the labor costs they claim are from RS Means. First, the prices WFA/Basin included for installation in the III - F TOTAL.xls," worksheet "Material Unit Cost" are not what are shown in their linked RS Means file. Second, WFA/Basin did not apply any overhead and profit to the generator installation cost. On Reply, BNSF Engineering Consultants used the RS Means data provided by WFA/Basin in their electronic workpaper for generator installation ("162-1.pdf") and added the overhead and profit. Since the material price is 2004 and the installation in 2005, separate historical indexes were applied.[170]

[169] BNSF Reply electronic workpaper "Switch Stand.pdf."

[170] BNSF Reply electronic workpaper "Generators.pdf."

The 20KW generator is installed at locations where there are one or two turnouts, while the 35KW generator is installed at the double crossovers or locations where there are three or four turnouts.[171]

Table III.F.3-4
Comparison Of BNSF's Turnout Costs With
WFA/Basin's Turnout Costs

ITEM	BNSF (000s)	WFA/Basin (000s)	Difference (000s)
No. 20 Turnout (Electric)	$15,904	$15,116	$788
No. 14 Turnout (Electric)	$677	$510	$167
No. 10 Turnouts (Manual)	$8,196	$6,066	$2,129
Switch Heaters	$1,367	$1,263	$105
Propane Tank	$185	$171	$14
Switch Stands Low Target	$143	$96	$47
Generators	$830	$0	$830
TOTAL	**$27,303**	**$23,223**	**$4,081**

Source: WFA/Basin Opening electronic workpaper "III - F TOTAL.xls;" BNSF Reply Exh. III.F-1.

h. Other Track Materials (OTM)

(1) Rail Lubricators

As WFA/Basin acknowledged, rail lubrication is commonly and widely used throughout the industry to reduce rail wear in curved track areas. WFA/Basin Opening Nar. at III-F-66. WFA/Basin placed rail lubricators on curves of three degrees or more. BNSF Engineering Consultants agree with this placement.

WFA/Basin's unit cost for rail lubricators is based on a 2003 quote from A&K. WFA/Basin developed a 2004 cost for lubricators in electronic workpaper "III - F TOTAL.xls," worksheet "Material Unit Cost" but failed to use that cost in calculating their total costs. *See* WFA/Basin Opening electronic workpaper "III - F TOTAL.xls," worksheet "TOTALS." BNSF

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[171] BNSF Reply electronic workpaper "III F LRR Construction.xls," worksheet "Generator."

used the correct indexed cost in its restatement. BNSF Engineering Consultants accept the installation cost of $4,300 each for rail lubricators that WFA/Basin received from Windgate Contractors.

(2) Tie Plates, Clips, Spikes and Anchors

(a) Specifications

On tangent track with wood ties and curves less than 3 degrees, WFA/Basin used two cut spikes per tie plate (four spikes per tie) as the spiking pattern on the LRR. They based this spiking pattern on the AREMA specification that reads "[t]ies shall be spiked with two rail-holding spikes on each rail *and* with additional rail-holding and plate-holding spikes as specified by the railway"[172] and on pictures purporting to show that BNSF uses this minimal spiking pattern.

There are two problems with WFA/Basin's evidence. First, the AREMA specification establishes the *minimum* standard and specifically leaves the spiking pattern for additional spiking to the railroads. The railroads base their pattern on experience with their particular traffic levels, the particular geology and the like. WFA/Basin attempt to use an AREMA minimum recommendation without taking into consideration the other parameters that would lead the railroads to require additional spikes.

Second, the pictures that WFA/Basin refer to depict only two ties plates along the entire LRR and neither of those tie plates is on the Orin Line. The picture in "05331.pdf" is at MP 223.09 on the Front Range Subdivision. The caption of the picture reads "2-3 spikes per tie plate." The tonnage on this segment is a small percentage of the traffic on the Orin Line, yet WFA/Basin construct the entire LRR with only two spikes per tie plate on the basis of this

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[172] WFA/Basin Opening Workpaper Vol. 10, p. 5908 (emphasis added).

example. The picture in "05690.pdf" shows one tie plate at West Donkey Creek on the Black Hills Subdivision on the second main. Also visible in the photo is another partial tie plate that has a non-rail holding spike, which would mean that there are at least three spikes per tie plate on this tie. Nonetheless, WFA/Basin construct an entire 446.51 track miles using only two spikes per tie plate on the basis of two existing tie plates that may conform to that standard. In contrast, BNSF's existing lines are built to a much higher standard. BNSF's standard for wood ties is a minimum of four spikes per tie plate.[173] But in reality, BNSF does not use wood ties on its heavy axle loading coal-hauling rail lines. Instead it uses concrete ties, which have a much better tie fastening system than even its higher standard for wood ties. As discussed in Section III.F.3.c above, 83% of the mainline miles replicated by the LRR have concrete ties. Although there may be some occasional instances where, on the remaining 17% of the lines, there is a wood tie with only two spikes in a plate, that is the exception, not the norm, and certainly not a sound basis for establishing a lower construction standard for a high density coal-hauling railroad such as the LRR.

BNSF Engineering Consultants have used the BNSF standard spiking patterns -- four spikes per tie plate on tangent sections -- for any areas where wood ties are used on the LRR. As discussed in Section III.F.3.e, BNSF Engineering Consultants have placed concrete ties in all curves. Based on a review of the track charts for the LRR segments with a small percentage of concrete ties, BNSF Engineering Consultants found that the majority of the concrete ties on those segments were located in curves. Therefore BNSF Engineering Consultants have used concrete ties in all of the curves on the LRR, eliminating any need for Pandrol plates, clips and additional screws and spikes on curves. The only spikes and clips that BNSF Engineering

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[173] BNSF Reply electronic workpaper "Spiking Pattern.pdf."

Consultants include in their restatement are the four spikes per tie plate on tangent track constructed on wood ties, two spikes per tie plate on wood ties in yard and set-out tracks, and the pads, clips and insulator costs associated with concrete ties. The concrete ties require two pads with two clips and two insulators per pad.

WFA/Basin used box anchors on both sides of every other tie on mainline and branch lines where the curvature does not exceed three degrees. BNSF's restatement does not include that specification since the curves are constructed with concrete ties. WFA/Basin also stated that anchors were placed on both sides of every tie for 200 feet on either side of a crossing or turnout. WFA/Basin Opening Nar. at III-F-67. In yards and on set-out tracks, WFA/Basin placed anchors on every fifth tie. *Id.* BNSF Engineering Consultants agree with these specifications. However, on turnouts, WFA/Basin add additional box anchors to only two of the three tracks outside of the turnout. The AREMA manual requires that "[i]n CWR territory, every cross tie should be box anchored for 200 feet ahead of the head block and 200 feet behind the frog on each welded track on each side of the turnout."[174] This applies to the LRR. Thus, where WFA/Basin add additional box anchors to 400 feet for each turnout, BNSF Engineering Consultants have used 600 feet.

(b) Unit Costs

WFA/Basin obtained unit costs for spikes, clips, plates and anchors from LB Foster and A&K. BNSF Engineering Consultants accept the material unit cost for tie plates and spikes used on wood ties, as well as the unit cost for anchors. Pandrol plates and clips are not needed

[174] BNSF Reply electronic workpaper "Anchoring Pattern.pdf."

because concrete ties are used in all curves.[175] BNSF has applied the correct index factor to bring the costs to 4Q2004. As discussed above, BNSF Engineering Consultants obtained costs from BNSF's AFE on the Shawnee to Walker project for the pads, clips and insulator costs for the concrete ties. The restated unit costs for all these materials are stated in BNSF Reply electronic workpaper "III F LRR Construction.xls," worksheet "Total Cost."

(3) Derails and Wheel Stops

WFA/Basin provided derails at all FED set-out track turnouts and at yard turnouts where cars are stored at Guernsey. Wheel stops were placed at the end of single ended tracks to keep cars from rolling off the end of the track. WFA/Basin Opening Nar. at III-F-68. BNSF Engineering Consultants accept WFA/Basin's placement of derails and wheel stops. However, BNSF's restatement contains additional derails and wheel stops to account for the 45 additional set-out tracks for DEDs on segments where concrete ties are used. Each additional set-out is single-ended and has one wheel stop and one derail. WFA/Basin used a 2005 unit cost from RS Means, including labor, overhead and profit. BNSF accepts the unit costs, properly indexed to 4Q2004.

i. Materials Transportation

WFA/Basin included the transportation cost in their costs for each track component, rather than as a separate cost. Accordingly, BNSF Engineering Consultants have addressed transportation cost issues in the relevant subsections. As noted in those sections, the critical flaw in WFA/Basin's transportation costs was that they neglected to deliver materials to sufficient railheads to meet the purposed construction schedule.

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[175] WFA/Basin Opening electronic workpaper "III - F TOTAL.xls," worksheet "Material Unit Costs."

j. Track Labor and Equipment

WFA/Basin relied on the quote from Windgate Constructors of Greensburg, PA, to cover all labor and equipment expenses associated with the installation of subballast, rail, ties, turnouts and other components.[176] The quote lists 25 unit costs for installation activities and states that these prices include "labor and equipment only," "all overhead and profit, taxes, licensing and insurance," "mobilization and demobilization" and "material transportation from the delivery points."[177]

BNSF Engineering Consultants take issue with WFA/Basin's track laying unit costs based on this Windgate quote. Windgate Contractors is a Pennsylvania firm that does not operate in Wyoming[178] and therefore is not familiar with construction of rail lines in the PRB. The price quote is based on limited information about the project, and clearly is a quote made specifically for this litigation, with Windgate given only the barest of information. For example, the quote states that the intent is to "provide a fully completed product as indicated in the drawings provided by Stone Consulting." In response to a workpaper request for the drawings that were provided to Windgate, WFA/Basin responded that there was no further information provided other than the track section sheets provided in their Opening workpapers.[179] In Mr. Boileau's opinion, the rates are low compared to costs that BNSF has paid for labor on projects using both BNSF employees and contract employees.

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[176] WFA/Basin Opening electronic workpaper "Windgate Track Construction.pdf."

[177] *Id.*

[178] On April 5, 2004, Ms. Gouger called and asked for a quote for track construction for 100 miles in Wyoming and was told that they did not work in Wyoming. BNSF Reply electronic workpaper "Windgate Memo.pdf."

[179] BNSF Reply electronic workpaper "Response to Workpaper Request.pdf."

Moreover, the Windgate quote is based on the WFA/Basin's rail specifications, which as discussed in the previous section, BNSF Engineering Consultants have changed to reflect the updated standards applied to high density, heavy axle loading rail lines in the PRB. Therefore, for mainline track laying, BNSF Engineering Consultants have used actual BNSF costs for labor on recent BNSF projects.

The real-world costs for construction, which more realistically reflect the costs to construct the lines replicated by the LRR, are the best evidence of record on what it would take to construct the lines replicated by the LRR.

For mainline track labor and equipment, BNSF Engineering Consultant, Ms. Gouger, reviewed the labor costs for the Shawnee to Walker project in AFE A040738, which was provided to WFA/Basin in discovery.[180] This AFE covers the grading of the entire 14.2 miles, but only 8.3 miles of the track construction from MP 103.4 to MP 111.7.[181] BNSF Engineering Consultants used the AFE information to determine the installation costs for mainline track.[182] BNSF Engineering Consultants summed the labor and equipment expenses for each item of the track construction section of the AFE, as shown in BNSF Reply electronic workpaper "III F 3 Track Labor.xls," worksheet "Mainline." These costs included unloading of materials, track laying, field welds, destressing, surfacing, work train, equipment maintenance and supervision. There were also costs for installing turnouts, but because the turnouts were swing nose frogs,

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[180] BNSF Reply electronic workpaper "III F 3 Track Labor.xls," worksheet "Mainline."

[181] The AFE was updated in 2005 to include the remaining track construction from MP 111.7 to MP 117.1, but the track labor costs for that portion included overruns attributable to BNSF cutting over the lines for use earlier than had been anticipated. Ms. Gouger did not include the additional costs associated with construction under traffic, but used only the 2004 AFE costs as they are more representative of a new line construction.

[182] BNSF Reply electronic workpaper "III F 3 Track Labor.xls," worksheet "Mainline."

which are not being used on the LRR, they were excluded. All private crossings costs were also excluded because both WFA/Basin and BNSF have calculated those costs separately in this case. The sum of the costs, excluding turnouts and private crossings, was then divided by the total miles (8.3) to derive a per track mile cost of ${ }. BNSF applied this unit cost to all mainline track.

For yard, set-out, helper and interchange tracks, and for turnouts, BNSF Engineering Consultants used a BNSF yard construction project in Joliet, Illinois.[183] This project involved the construction of 34.7 track miles and included 40 No. 11 turnouts, six No. 15 turnouts and two No. 20 turnouts. BNSF contracted this track construction project to Harbour Contractors, Inc., but supplied all the materials. BNSF Reply electronic workpaper "III F 3 Yard Track Labor.txt" contains the contractor detailed labor and equipment costs. BNSF Engineering Consultants summed the items from this document, as shown in BNSF Reply electronic workpaper "III F 3 Track Labor.xls," worksheet "Yard." The costs included installation of ballast, rail, OTM and welds. Following the same methodology and criteria as for the mainline track, Ms. Gouger developed a per track mile cost of ${ },[184] excluding turnouts, which she applied to all yard track, helper and set-out tracks.

Ms. Gouger separately calculated the total costs for installing each size turnout and developed a unit cost per turnout. The turnout installations costs are ${ },[185] ${ }, and

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[183] BNSF Reply electronic workpapers "III F Track Labor.xls," worksheet "Yard Quantities" and "Track Labor.pdf."

[184] The 2002 Joliet costs were adjusted to Wyoming using RS Means. BNSF Reply electronic workpaper "Track Labor.pdf,"

[185] BNSF Engineering Consultants note that this installation cost is low for No. 11 turnouts, but use it in this context because the complete contractor costs are used for yard track construction costs.

${ } for No. 11, No. 15 and No. 30 turnouts, respectively. These unit costs were applied to the quantities of No. 10, No. 14, and No. 20 turnouts, respectively, in BNSF's restatement.

BNSF Engineering Consultants reviewed the subballast installation costs for the Shawnee to Walker project and determined that they are not applicable to the LRR. The project was bid two ways, with BNSF supplying materials either to subgrade or to stockpile. The unit cost for supplying the material to subgrade is not applicable to the LRR because that requires the use of an adjacent mainline, which is not available to the LRR. The unit cost for delivery to a stockpile is also not applicable because that assumes that the material would be delivered by the railroad to multiple places along the project length. However, for the LRR, there are only four locations along the entire 220 route miles where material can be delivered -- Donkey Creek, Shawnee, Guernsey and Moba. Since the Shawnee to Walker project is only 14.2 miles in length (or 8.3 for track construction) the unit cost for installing subballast delivered to stockpile taken from that AFE would not reflect the on-line transportation costs that would apply to the LRR. Therefore, in the absence of subballast installations costs applicable to the LRR, BNSF Engineering Consultants accept the subballast installation cost from Windgate.

BNSF Engineering Consultants also accept the Windgate quotes for rail lubricators, bonded insulated joints, and switcher heaters because they were unable to discern the quantities of those items in the Shawnee to Walker and Joliet documents and thus could not develop a per unit cost.

BNSF's total track construction costs on Reply are $133 million, an increase of $41 million over WFA/Basin's Opening estimate.

BNSF Engineering Consultants' restatement of total track labor costs is included in BNSF's LRR track construction totals, which are contained in Reply electronic workpaper "III F LRR Construction.xls," worksheet "Total Cost."

4. Tunnels

There are two tunnels on the lines replicated by the LRR located near Guernsey. WFA/Basin took the lengths of the two tunnels and applied a base unit cost per linear foot of $2,561 developed in the *Coal Trading* decision. WFA indexed the 1980 tunnel cost to 4Q2004, using the 2004 RS Means index, to get a unit cost of $5,801 per LF. WFA/Basin Opening Nar. at III-F-70. As discussed above, WFA/Basin erred in their application of the RS Means index. WFA/Basin use the estimated January 2004 index and then apply the ENR index to index the cost from January 2004 to October 2004. As explained in Section III.F.3. above, there is no reason to use an *estimated* index for historical costs when there are historical data available. BNSF Engineering Consultants, therefore, used the July 2004 index from the 2005 Means book to index the 1980 cost to July 2004 and then applied the ENR construction index to bring the cost to October 2004, as shown below:

July 2004 from RS Means 2005	=	96.8
July 1980 from RS Means 2005	=	42.4
July 2004 from ENR	=	7126
October 2004 from ENR	=	7314

Tunnel Cost = $2561 / 42.4 * 96.8 / 7126 * 7314 = **$6,001 / LF**[186]

[186] BNSF Reply electronic workpaper "III F LRR Construction.xls," worksheets "Historical Factor" and "Tunnels."

After proper indexing, BNSF's restated unit cost for tunnels is $6,001 per linear foot. BNSF Engineering Consultants applied that unit cost to the total length of the two tunnels to derive their restated tunnel investment of $28.7 million.

5. Bridges

According to WFA/Basin's Opening Narrative, the LRR requires a total of 100 bridges crossing over natural barriers with a total length of 13,435 linear feet, and an additional 19 overpass crossings with a total length of 2,400 linear feet, crossing over roadways.[187] WFA/Basin have determined a total cost for LRR bridges of $58.1 million.

BNSF Engineering Consultant Gouger has analyzed WFA/Basin's Opening Narrative, quantity calculations, spreadsheets and unit cost materials and has determined that WFA/Basin's overall methodology for developing LRR bridge costs is acceptable; however, WFA/Basin's cost development contains several errors and omissions that understate bridge investment costs for the LRR. Based on a thorough analysis of the bridge requirements along the proposed LRR route, Ms. Gouger has determined that the total bridge investment required for the LRR is $55.9 million.

a. Inventory

(1) LRR Bridges

WFA/Basin assumed that the LRR would have bridges in all the locations where they appear on BNSF lines, and developed their bridge inventory based on BNSF line segment data. WFA/Basin Opening Nar. at III-F-71. The LRR bridge inventory appears in WFA/Basin's Opening electronic workpaper "LRR Bridge Costs.xls," worksheet "Bridge List" and includes

[187] WFA/Basin Opening electronic workpapers "LRR Bridge Costs.xls," and "LRR Overpasses Costs.xls."

segment and milepost locations, structure type, span numbers, and total length and height, developed from current BNSF bridge locations and designs. BNSF Engineering Consultants have reviewed and accepted WFA/Basin's inventory of LRR bridges, as well as the number of tracks constructed at each location.

(2) Overpasses

In previous cases, complainants have improperly excluded overpasses from their inventories, and not included the costs for the construction of these structures, arguing that BNSF or its predecessors had constructed lines in these areas prior to the placement of roads and, as a result, would not have incurred costs for any bridges not crossing over natural barriers.[188] *See, e.g.,* AEP Texas Opening Nar. at III-F-67 (Public Version). By failing to include any cost for these bridges -- either as capital investment or maintenance-of-way expense -- complainants have repeatedly understated stand-alone costs. BNSF has consistently countered these assertions with evidence from the ICC Engineering Reports showing that BNSF lines did not predate the building of roads in many instances and evidence from BNSF's own records demonstrating construction costs incurred for overpasses even when BNSF's lines *did* predate the construction of the road. *See, e.g.,* BNSF (AEP Texas) Reply Nar. at III.F-136 to 138.

In a departure from the prior practice of complainants in SAC cases, WFA/Basin have included almost the full costs associated with the construction of overpasses, or grade-separated crossings. Recognizing that BNSF has incurred costs for LRR overpasses as the later entrant, WFA/Basin included the full costs for 17 of the 19 overpasses found on the LRR. WFA/Basin

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[188] Complainants have made this argument without any evidence that BNSF has not incurred construction, maintenance, and/or replacement costs for these structures, which they are required to do as the party bearing the burden of proof on this issue. *Coal Rate Guidelines,* 1 I.C.C.2d at 547; *see also Xcel* at 108.

Opening Nar. at III-F-77. Consistent with the burden of proof that they bear on these issues, WFA/Basin have also included the full cost of the highway bridge found at the Guernsey Yard where they were unable to show that BNSF did not incur any costs for the construction of this bridge. *Id.* Finally, WFA/Basin have adopted the approach accepted by the Board in *Xcel* and have included 10 percent of the building costs for the overpasses where they have determined that BNSF lines were in place prior to the construction of the intersecting road. *Id.*

WFA/Basin developed a separate overpass inventory and applied a cost formula to determine the cost of LRR overpasses that is independent from their bridge design and cost calculations.[189] BNSF Engineering Consultant Gouger's analysis of the WFA/Basin's inventory, design and costs for overpasses is contained in Section III.F.8.c on crossings.

b. Bridge Design

As an initial step, WFA/Basin placed each bridge in their LRR inventory into one of four standard bridge design categories, Types I, II, III, and IV, on the basis of certain characteristics. According to WFA/Basin's Opening Narrative, bridges falling into Type I would be built with pre-cast concrete decks with a span length between 13 and 14 feet for the longest span, and with three piles serving as the foundation for each pier and abutment. Any LRR bridge with a height of 30 feet or less and a span length of 16 feet or less for the longest span was placed in this category. WFA/Basin Opening Nar. at III-F-75. Type II bridges have pre-cast concrete decks with a span length between 28 to 33 feet for the longest span, three piles per pier and abutment, and a height of 30 feet or less. This category would cover any LRR bridge that is no taller than 30 feet and has a span length between 16 and 35 feet for the longest span. *Id.* Type III bridges would have 60-foot spans constructed with I-girders and cast-in-place decks and larger

[189] WFA/Basin Opening electronic workpaper "LRR Overpass Costs.xls."

substructures than the Type I and II bridges. Type III bridges would encompass any LRR bridge with a height of 30 feet or less and a span length between 35 and 65 feet for the longest span. *Id.* at 75-6. According to WFA/Basin, Type IV was the bridge category designed to address the unique substructure requirements associated with the tallest and/or longest bridges found on the LRR. Type IV bridges would be constructed using a cast-in-place concrete deck over an increased number of I girders, and more substantial foundations consisting of driven piles for abutments and drilled caissons socketed into rock for columns. LRR bridges that are taller than 30 feet or possess spans that are longer than 65 feet were placed in this category. *Id.* at 76.

While largely basing the specifications of individual LRR bridges on existing BNSF bridges, WFA/Basin made several adjustments to the design of the bridges that BNSF originally built and maintained along lines being replicated by the LRR. First, WFA/Basin departed from the existing BNSF bridge inventory and replaced five bridges found on the BNSF line with culverts.[190] Because of the short length of the real-world structures, BNSF Engineering Consultants accept this departure and have included the costs for these structures in their restatement of culvert costs, which are found in BNSF Reply electronic workpaper "III F 2 Culverts.xls."

Second, WFA/Basin made problematic adjustments to the combination of span lengths found in three existing BNSF bridges being replicated on the LRR. BNSF Engineering Consultants suspect that these changes were the result of errors in WFA/Basin's spreadsheets and were not intentional design changes. BNSF Bridge 103.18, located on the Canyon Subdivision, is a 206-foot structure consisting of one 16-foot span, two 20-foot spans and three

[190] WFA/Basin Opening electronic workpaper "LRR Bridge Costs.xls," worksheet "Bridge List."

30-foot spans. According to WFA/Basin's workpapers, it designed Model Bridge 103.18 to include two spans with a maximum span length of 16 feet, with a maximum possible length of 32 feet, placing it in the Type I category.[191] BNSF Engineering Consultants have fixed the span number and the width based on the original characteristics of the bridge and redesigned the bridge using the appropriate 60-foot spans, placing the bridge in the Type III category.[192] BNSF Bridge 0.2 on the Campbell Subdivision is a 66-foot bridge with three spans that WFA/Basin have designed with two spans with a maximum length of 22 feet each.[193] Similarly, BNSF Bridge 236.04 in the Front Range Subdivision is a 60-foot bridge built with two 30-foot spans, but WFA/Basin only included one span that is 30 feet long.[194] BNSF Engineering Consultants have added the necessary additional span to each of these two bridges; these additions do not result in a change from the Type II classification of either bridge but impact the material quantities and labor required to construct the bridge.[195]

Third, WFA/Basin departed from BNSF design specifications and changed all LRR bridges with steel spans to concrete spans.[196] For all LRR bridges, either pre-stressed concrete spans or a cast-in-place decks with pre-cast beams were used. BNSF Engineering Consultants accept this change with one caveat -- when bridges are constructed with concrete spans instead of steel truss spans, the total bridge length typically is increased to account for a resulting lower

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[191] *Id.* at row 49.

[192] BNSF Reply electronic workpaper "III F 5 Bridges.xls," worksheet "Bridge List."

[193] WFA/Basin Opening electronic workpaper "LRR Bridge Costs.xls," worksheet "Bridge List," row 6.

[194] *Id.* at row 58.

[195] BNSF Engineering Consultants' restatement of LRR bridge specifications is contained in BNSF Reply electronic workpaper "III F 5 Bridges.xls" worksheet "Bridge List."

[196] WFA/Basin Opening electronic workpaper, "LRR Bridge Costs.xls," worksheet "Bridge List."

chord and/or increased pier widths. The low chord is the elevation of the bottom of the span or girder. The headroom under the bridge is decreased with the use of concrete spans as more of the structure occupies the space underneath the track surface. Put another way, when a bridge is constructed with steel truss and through plate spans, the track is, to a varying extent, surrounded by the supporting metal structure, rather than sitting on top of the entire structure, as it does with concrete.[197] A similar loss of volume occurs where changes have been made to span lengths that require an increase in the size of the piers that are being constructed, therefore decreasing the flow area available underneath the superstructure.

As a result of the decreased flow area accompanying the change to a concrete superstructure, a bridge would be constructed with additional length, moving the abutments back and constructing a deeper bridge deck to compensate for the decrease in flow area. Maintaining the flow area is important in light of Federal Emergency Management Agency (FEMA) guidelines on preparing for flood events -- specifically the requirement that no backwater (0.00 feet) be present during the 100-year flood event, which is a hypothetical flood scenario used to determine sound engineering practices.[198] WFA/Basin's own workpapers contain evidence on the need to build in more flow area when structure changes reduce the available volume for water to occupy. For example, WFA/Basin relied extensively in their Opening Evidence on information taken from the Jennison paper, a conference report by a BNSF employee on the construction of Bridge 412.1 over the South Canadian River. This paper comments on the fact

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[197] Examples of through plate girder bridge structures are included in BNSF Reply electronic workpaper "Bridges.pdf;" the decrease in the low chord when these span types are replaced with concrete beams is apparent when these samples are compared to a concrete girder, as shown in the plans for BNSF Bridge 465.0, which WFA/Basin included in Opening Workpaper Volume 10 at pp. 05925-39.

[198] BNSF Reply electronic workpaper "Bridges.pdf."

that the bridge was constructed with additional length (approximately 100 feet) because of the switch to a concrete superstructure, and the fact that "more flow area would be needed because of the greater total pier width in the design."[199]

WFA/Basin claim to have taken the reduction of flow into consideration when they constructed the LRR bridges with concrete spans and state that their engineers reviewed all bridge designs to ensure that the amount of available flow area was equal to or greater than the flow of the current BNSF structure. However, WFA/Basin did not make any adjustments to compensate for the change to concrete, and did not include any description of these calculations or any workpapers to support the claims by their experts that there was no impact on flow from the transition to concrete. This approach effectively prevents BNSF Engineering Consultants from verifying the claims of WFA/Basin's experts; allowing WFA/Basin to present calculations to the Board on Rebuttal would deprive BNSF of any meaningful opportunity to respond.

Because WFA/Basin acknowledged the need to make accommodations for reductions in the area of flow from design changes and have provided no basis for their assertions that they have done so, BNSF Engineering Consultants have made the adjustment described by the Jennison paper to the LRR bridges of substantial size that cross over bodies of water that WFA/Basin have converted from steel to concrete spans. The two LRR bridges that require adjustments to maintain the area of flow are the Type IV Bridges 133.01 and 95.65 that cross over the North Platte River in the Canyon Subdivision. BNSF Engineering Consultants have determined the percentage increase in length that resulted from the conversion of Bridge 412.1 (the bridge described in the Jennison paper that serves as the basis for the Type IV bridge design)

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[199] WFA/Basin Opening Workpaper Vol. 10, pp. 05943-4.

from a steel truss bridge to a concrete one and have applied this percentage increase -- 14 percent -- to the length of LRR Bridges 133.01 and 95.65.[200]

c. Costing Methodology

According to WFA/Basin's Opening Narrative, basic bridge costs were developed directly from BNSF's own bridge data, produced in discovery. WFA/Basin Opening Nar. at III-F-78 to 79. WFA/Basin determined the total costs for LRR bridges by developing separate cost formulas for each of the four bridge "types" described above. For each bridge type, WFA/Basin calculated standardized material and installation costs for the bridge components they would use to construct that particular bridge type, including wing walls, abutments, columns, decks and miscellaneous bridge materials.[201] WFA/Basin then applied those standardized costs to each LRR bridge based on their classification as a particular bridge type, the bridge length, and the number of spans.[202] BNSF Engineering Consultants have analyzed the methodology used by WFA/Basin to determine bridge investment for the LRR and have discovered certain design shortcomings and cost miscalculations, which are discussed in detail below.

(1) Classification of LRR Bridge by Design Type

As described above, WFA/Basin's first step was to place each bridge in the LRR inventory into one of four standard bridge design categories, Types I, II, III, and IV, on the basis of certain characteristics. With the exception of BNSF Bridge 103.18 which was incorrectly characterized as a Type II bridge as discussed above, BNSF Engineering Consultants accept WFA/Basin's division of the bridges in the LRR inventory into Type I, II, III or IV.

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200 BNSF Reply electronic workpaper "III F 5 Bridges.xls," worksheet "Bridge 412.1."

201 WFA/Basin Opening workpaper "LRR Bridge Costs.xls," worksheet "Model Costs."

202 WFA/Basin Opening workpaper "LRR Bridge Costs.xls," worksheet "Bridge List."

(2) Development of Model Bridge Costs

For each of the four bridge types described above, WFA/Basin developed a cost formula or algorithm that was applied to all the LRR bridges that they placed into that "type" category. The cost formulas for Types I, II and III were developed from cost and design data produced in discovery for WFA/Basin's "Model Bridges," 21 recent BNSF bridge projects on the Panhandle Subdivision.[203] The cost information for Type IV bridges was developed from the Jennison paper on BNSF Bridge 412.1, mentioned above, and other materials detailing the construction of that bridge. WFA/Basin Opening Nar. at III-F-76, III.F-78 to 79. BNSF Engineering Consultants' analyses of these two approaches are addressed below.

(a) Type I, II and III Bridges

To determine the total cost for material, installation and transportation for each of the Type I, II, and III bridges, WFA/Basin applied the following formula:

Bridge cost = abutment cost + (column cost x number of columns) +
(per linear foot cost x length of bridge)

To determine the costs to insert into the equation for each bridge type, WFA/Basin calculated average unit costs and per linear foot costs based on real-world BNSF bid and AFE information for the 21 BNSF Model Bridges that they selected, and general unit cost information derived from BNSF price lists provided in discovery. In reviewing WFA/Basin's development of standardized cost formulas for Type I, II and III bridges, BNSF Engineering Consultants discovered several oversights and calculation errors that resulted in the understatement of bridge

[203] WFA/Basin averaged information from eight Panhandle bridge projects for its Type I algorithm, ten for its Type II algorithm, and three for its Type III algorithm.

investment for the LRR.[204] These shortcomings in methodology and execution, as well as BNSF Engineering Consultant Gouger's adjustments to WFA/Basin's Model Bridge Costs, are discussed below.

WFA/Basin's first step was to develop the "type-specific" costs for standard pre-cast bridge materials that would be used to construct LRR bridges classified as Type I, Type II, or Type III. For each of the three bridge types, WFA/Basin determined individual unit costs for wing walls, abutment caps, and column caps, and per linear foot costs for deck spans (a pre-cast deck for Type I and II bridges and a cast-in-place deck with pre-cast girders for Type III bridges). WFA/Basin developed these individual costs from a combination of bid data relating to the 21 Model Bridges they selected, as well as from BNSF general price lists.[205]

BNSF Engineering Consultants take issue with two of WFA/Basin's unit costs for pre-cast materials. First, WFA/Basin incorrectly extracted a bearing pile installation cost of { } from the original BNSF bid documents for their Model Bridge 467.8. BNSF Engineering Consultants have included the correct installation cost of { } in their restated model bridge costs.[206]

Second, WFA/Basin build their Type III (and Type IV bridges) with 60-foot cast-in-place decks over 60-foot pre-cast I girders. The unit cost that WFA/Basin used for 60-foot I girders,

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[204] WFA/Basin's statement of the Model Bridge Cost was contained in Opening electronic workpaper "LRR Bridge Costs.xls," worksheet "Model Cost."

[205] WFA/Basin developed 2003 unit costs from a January 1, 2003 BNSF price list. As described in the introduction to Section III.F and in Section III.F.3.d.(3) above, BNSF updates its price lists in the first quarter of the year, and the January 2003 price list would still reflect 2002 prices. BNSF Engineering Consultants have determined, however, that the prices for bridge materials generally remained constant between the two years, and have not made any adjustments to WFA/Basin's unit costs.

[206] The bid data containing the bearing pile installation cost for this bridge, { }, is found at WFA/Basin Opening Workpaper Vol. 10, p. 05974.

taken from a BNSF price list, is clearly a price for a different type of girder, a "prestressed voided T girder" of unspecified length, which WFA/Basin apparently used because BNSF does not stock a 60-foot I beam. In addition to being a different type of girder than the one used in WFA/Basin's design for these bridges, a standard BNSF T-style girder is not suitable for use in 60-foot spans, and moreover, the type of T girder that BNSF keeps in stock and would include in a price list is a maximum of 32 feet.[207] WFA/Basin's mistake should have been obvious to them when they calculated a per linear foot cost for Type III bridges with its longer and stronger spans that was cheaper than Type II by { } -- 60% less! To determine a unit cost for the 60-foot I beam, BNSF Engineering Consultants conducted a cost-per-ton analysis that compared the weights of beams used in Type I and II Model Bridges and the weight of the I girder WFA/Basin included in their Type III bridge design.[208] They have developed a unit cost of $6,303 for a 60-foot I girder ($215.50 per ton) that has been applied to all Type III bridges.

After developing unit costs for the pre-cast items, WFA/Basin next calculated the average per foot cost of the remaining bridge materials. WFA/Basin did this by averaging the per linear foot cost of "miscellaneous additional material" for each of the 21 Model Bridges. For each Model Bridge, WFA/Basin took the estimated cost for all pre-cast items used to construct the Model Bridge and subtracted that amount from the total bridge materials cost that BNSF actually incurred for the construction of the bridge, with the remainder (the miscellaneous additional materials) turned into a per linear foot cost. BNSF Engineering Consultants accept this general approach, but have found several errors in WFA/Basin's execution.

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[207] BNSF Reply electronic workpaper "Bridges.pdf."

[208] BNSF Reply electronic workpaper "III F 5 Bridges.xls," worksheet "Model Cost."

WFA/Basin used aggregate AFE data provided by BNSF in the course of discovery to determine the total cost incurred by BNSF for the construction of the 21 bridges it used as their Model Bridges. In an effort to provide the complainants with as much access to BNSF real-world costs as possible, BNSF provided unprecedented amounts of construction data to WFA/Basin in the form of electronic and paper files maintained by the BNSF Engineering Department in the ordinary course of business. BNSF produced a considerable quantity of information from an AFE database, including a report of line item AFE costs recorded in the database for projects that were covered by the list of hardcopy AFEs requested by WFA/Basin in discovery, and a similar report covering BNSF projects in the Panhandle Subdivision, an area where, since 2003, BNSF has undertaken an intense program of capacity improvements including extensive track construction and bridge construction projects.[209] This database contains itemized cost entries for activities and materials used in BNSF construction projects, organized predominantly by AFE. Each entry has a varying level of specificity. For instance, there are entries for the purchase of a specific quantity of a clearly identified material (*i.e.*, "RAIL, 136# NS WLD, LF", item number "77136S000N"), entries for the flat sum payment to a contractor without any breakdown for labor and/or material costs, and entries for a general line item expense (*i.e.*, "bridge materials listed") without any detail as to specific materials included or their quantities. BNSF also provided WFA/Basin with a smaller report from the AFE database of entries containing descriptions connecting an individual line item expense to a specific Panhandle bridge project, or to an AFE that included one or more of these bridge

[209] BNSF produced this information, which included over 440,000 line item entries, to WFA/Basin on BNSF/LR 0027, files "Laramie River afe info Part 1.txt," "Laramie River afe info Part 2.txt," and "Panhandle afe info.txt."

projects, as a potential source of real world unit cost information for bridge materials.[210] WFA/Basin took the entries from this smaller report of bridge AFE data that contained references to their 21 Model Bridges and added them up to determine BNSF's total material costs for each of these Model Bridges. BNSF Engineering Consultants have identified two problems with this approach.

First, in determining the actual BNSF's costs for the construction of Bridge 477.1, WFA/Basin included costs for the construction of Bridge 477.7,[211] which is a completely different structure. BNSF Engineering Consultants have removed the 477.7 cost items from the calculation of the 477.1 construction costs.

Second, WFA/Basin have calculated negative "miscellaneous additional material" costs for several Model Bridges that were constructed as part of BNSF Project BF24671 (Lora to Codman). This is a clear indication that WFA/Basin have not included the full amount that BNSF incurred in building the bridges in the Lora to Codman Project, as it is not possible that the total material cost of a bridge is *less* than the total cost of *just* the pre-cast components. Moreover, review of the bridge plans, included by WFA/Basin in their Opening workpapers, for Model Bridges with negative values reveals that certain costs are missing. For example, the plans for bridge 483.2 show that 46 piles are required, but the WFA/Basin list of "total" BNSF

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[210] BNSF produced this information to WFA/Basin on BNSF/LR 0022, as file "Panhandle Bridge Components.xls." In a February 24, 2005 letter to WFA/Basin (BNSF Reply electronic workpaper "Bridges.pdf"), BNSF explained that extensive Engineering Department files on recent BNSF capacity improvement projects that were made available to WFA/Basin as part of discovery did not contain unit cost information of bridge materials, and that some bridge unit cost information was available in the form of bridge-related entries into the AFE database, which BNSF also provided to WFA/Basin.

[211] *See* WFA/Basin Opening electronic workpaper "LRR Bridge Costs.xls," worksheet "materials," row 90 and 91.

costs for that bridge only includes the costs for 22 piles.[212] Indeed, a search through the larger database file provided to WFA/Basin in discovery reveals that there are several costs associated with these bridges or with the AFE covering the construction of a number of these bridges, that were not captured in WFA/Basin's totals. This is not surprising, as BNSF or the contractor often supplies the materials through invoices that are not recorded in the AFE database with a designation as bridge material. To determine what happened in these particular projects (which are relatively recent), Ms. Gouger requested that BNSF conduct a search for actual project invoices to see whether there were any that applied to the these bridges not appearing in the AFE database report of bridge materials provided in discovery. BNSF was able to locate several original contractor-supplied invoices for these bridges[213] that contain costs that were incurred by BNSF but were not recorded as bridge material in the AFE database. Additionally, these original invoices demonstrate that the negative miscellaneous material costs could not result from WFA/Basin's use of units costs for pre-cast items below those actually incurred by BNSF. It is clear that the unit costs that BNSF actually paid for these materials are significantly higher than the unit costs used by WFA/Basin in their Model Bridge analysis.[214]

The inclusion of these negative cost values in determining an average per linear foot cost for miscellaneous additional bridge materials clearly skews the results. As in any averaging process, the removal of obvious outliers is essential to developing a reliable result -- this is certainly the case where the "outliers" are irrational negative numbers that clearly indicate

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[212] BNSF Reply electronic workpaper "Bridges.pdf."

[213] BNSF Reply electronic workpaper "Bridges.pdf."

[214] BNSF Reply electronic workpaper "Bridges.pdf."

calculation errors.[215] In calculating the per linear foot cost for miscellaneous bridge materials, BNSF Engineering Consultants therefore have excluded the data from the bridges from the Lora to Codman Project that have negative values for miscellaneous material costs.[216] Although there are other Model Bridges in this group with very low per LF costs for miscellaneous materials relative to the costs of the other Model Bridges, BNSF Engineering Consultants have conservatively kept them in the calculation of an average per linear foot cost.

(b) <u>Type IV Bridges</u>

WFA/Basin developed costs for Type IV bridges using the same general methodology as it did with Types I, II and III (bridge cost = abutment cost + (column cost x number of columns) + (per linear foot cost x length of bridge)). However, they used the actual costs for a single BNSF bridge, 412.1, obtaining unit cost and design information from the Jennison paper and background documents on the construction of this bridge. As stated above, BNSF Engineering Consultants accept this general methodology. However, the bid tab relied on by WFA/Basin to determine costs includes a per LF cost for the installation of I beam girders but does not include any material costs for those girders. Costs for certain materials that clearly are necessary to construct a bridge are frequently not included in the bid tabs for that project because it is standard practice for BNSF to contract out the construction of a bridge but still obtain certain materials from third-party suppliers which it delivers to the contractor for installation. Mr.

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[215] As shown in BNSF Reply workpaper "III F 5 Bridges.xls," worksheet "Model Cost (WFA Open)," the per linear foot costs for all eight bridges constructed as part of BNSF Project BF24671 (Lora to Codman) are out of sync with the costs of the remaining Model Bridges. This workpaper also demonstrates that the "Per Linear Foot AFE Specified Bridge Material" for the thirteen Model Bridges that were not constructed as part of this one BNSF project fall into a comparable range.

[216] The Model Bridges with a negative value for miscellaneous bridge materials are 475.8 (Type I), 472.7 (Type II), 474.8 (Type II), 477.1 (Type II), 481.0 (Type II), and 483.2 (Type III).

Boileau has confirmed that in this particular case BNSF provided the I girders required for this project and incurred the cost directly.

Therefore, as described in the previous section on Type I, II and III bridges, BNSF Engineering Consultants have developed a unit cost for the I-Beam girders through a cost-per-ton analysis of I girder weights compared to the weights of beams used in Type I and II Model Bridges. The Jennison report that WFA/Basin rely on so extensively supports both the inclusion of the I beams and the beam cost of $525.50 per linear foot developed by BNSF. According to this paper, BNSF's final cost for constructing Bridge 412.1 was approximately $3,500/LF.[217] When the cost of the I girder calculated by BNSF is added to the cost contained in the Bridge 412.1 bid tab, the result is total bridge cost of $3,483/LF, whereas WFA/Basin's cost for their Type IV bridge is less than $3,000/LF.[218]

(3) Indexing Errors

In converting bridge material and labor costs to 4Q2004 prices, WFA/Basin made the same indexing errors that they made to other road property costs. As previously discussed in the introduction to Section III.F.3, when WFA/Basin converted 2005 prices to 4Q2004, they actually inverted the ENR Construction Cost indexes in calculating the historical factor to be applied,[219] and as a result, understated these costs. WFA/Basin also erred in indexing cost from 1999 through 2004 to 4Q2004. WFA/Basin used the RS Means 2005 *estimated* historical index to

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[217] WFA/Basin Opening Workpaper Vol. 10, p. 05947.

[218] BNSF Reply electronic workpaper "III F 5 Bridges.xls," worksheet "Bridge 412.1."

[219] See WFA/Basin Opening electronic workpaper "Historical Factors Worksheet.xls." The ENR Index used by WFA/Basin was included as WFA/Basin Opening electronic workpaper "Engineering News-Record Construction Cost Index.pdf," which shows the January 2005 ENR index as 7297 and the October 2004 index as 7314.

develop indices for prices from 1999 through 2004.[220] Applying the estimated index to adjust *2005 prices* is appropriate because the 2005 prices are also estimates. But to adjust prices from prior years, actual index data are available and should be applied. RS Means provides an *actual* historical index as of July 2004. Therefore, BNSF Engineering Consultants indexed prices from all years prior to 2005 to July 2004 and then used the ENR data included in WFA/Basin's Opening Evidence to adjust the July 2004 prices to October 2004. This adjustment slightly lowered the historical factors used by WFA/Basin for pre-2005 prices. BNSF Engineering Consultant's reindexing is reflected in their final bridge investment costs, which are found in BNSF Reply electronic workpaper "III F 5 Bridges.xls," worksheet "Bridge List."

WFA/Basin also made adjustments to material and labor costs to reflect location utilizing the location factor from the RS Means Site Construction Index.[221] BNSF Engineering Consultants accept WFA/Basin's approach to location indexing.

(4) <u>Transportation</u>

WFA/Basin included only minimal transportation costs which they have developed from a list of trucking costs associated with BNSF bridge projects that were extracted from a BNSF AFE database and provided in discovery.[222] While based on trucking costs actually incurred by BNSF during the construction of the Model Bridges, for the reasons discussed below, WFA/Basin's transportation costs do not cover the full transportation costs incurred by BNSF, resulting in the understatement of transportation costs for LRR bridge materials.

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[220] See WFA/Basin Opening electronic workpapers "Historical Factors Worksheet.xls" and "Historical 2005 Page 437.pdf."

[221] *See* WFA/Basin Opening electronic workpaper "Location Factor.xls," worksheet "Location Factor" and Workpaper Vol. 10, pp. 05962-3.

[222] WFA/Basin Opening electronic workpaper "LRR Bridge Costs.xls," worksheet "trucking."

As described in Section III.F.5.c.(2).(a) above, BNSF provided WFA/Basin with considerable amounts of construction data in the form of electronic and paper files maintained by the BNSF Engineering Department in the ordinary course of business. As part of this extensive production effort, BNSF provided a considerable quantity of information from an AFE database, including a report from that database of entries containing descriptions connecting an individual line item expense to a specific Panhandle bridge project or AFE. Included in that report was a list of payments made to third party transportation providers for the trucking of materials. WFA/Basin incorrectly treated these trucking costs attributed to the Model Bridge construction projects as the total transportation costs incurred by BNSF for these bridges.

As discussed above, BNSF regularly provides bridge materials to independent contractors who construct bridges on BNSF lines. During the construction of the Panhandle bridges that WFA/Basin used in their Model Bridge analysis, BNSF transported a majority of the bridge materials, including pre-cast members and miscellaneous bridge materials, to the bridge construction site by truck. However, as demonstrated in BNSF requisition documents provided to WFA/Basin in discovery,[223] two categories of materials -- pilings and braces -- where regularly transported by BNSF from the processing plant in Blythville, Arkansas *via rail.* This rail transportation expense would not be captured in the "trucking" expense report relied on by WFA/Basin, which is clearly a list of freight charge payments made to a truckload vendor during these particular projects.

BNSF Engineering Consultants accept WFA/Basin's transportation cost as representative of the transportation costs associated with those bridge materials that BNSF would have

[223] The requisition documents that WFA/Basin was given access to in discovery reference where the material is being shipped from, the method of shipment and the destination. BNSF Reply electronic workpaper "Bridges.pdf."

delivered *via truck* to the Panhandle "Model Bridge" projects. For the remaining two categories of materials not covered by these trucking expenses -- pilings and braces -- BNSF Engineering Consultants have included the cost of transporting these materials via rail. Because WFA/Basin's schedule provides that the bridges are to be erected in the initial construction stage before track construction is commenced, transportation to the bridge construction sites over the LRR lines is not an option that would be available to WFA/Basin. BNSF Engineering Consultants have calculated the cost of delivering these materials from the supplier in Blythville, Arkansas by rail via UP to LRR railheads at Moba, Guernsey, Shawnee and Donkey Creek. They did so by determining the shortest rail route from the supplier to each the of four railheads using PC Miler and applying the per ton mile cost of $0.035 adopted by the Board in *WPL* and used by WFA/Basin to calculate transportation costs for several track materials. Because this calculated expense would only cover transportation to the nearest railhead, an additional cost would be incurred to move the materials from the railhead to the construction site for each LRR bridge by truck (or rail, if available). However, trucking entries in the BNSF AFE database do not contain sufficient information to determine exact origins and destinations, and it is at least feasible that construction site delivery would be covered by one of the trucking expense entries already included in WFA/Basin's analysis. BNSF Engineering Consultants have conservatively not included this additional expense, and have added only the cost of transporting piles and braces via railroad to LRR railheads to the per linear foot transportation additive that WFA/Basin applied to each LRR bridge.[224]

[224] BNSF Reply electronic workpaper "III F 5 Bridges.xls," worksheet "Bridge List."

BNSF Engineering Consultant's restatement of the total bridge investment required for the LRR is contained in BNSF Reply electronic workpaper "III F 5 Bridges.xls," worksheet "Bridge List."

6. Signals and Communications

a. Signals

BNSF Engineering Consultants reviewed WFA/Basin's evidence on signal costs and concluded that they are generally in agreement with WFA/Basin's basic design and selected components for the LRR signal system. However, BNSF Engineering Consultants found some discrepancies, errors and omissions in WFA/Basin's evidence, as discussed below.

(1) Centralized Traffic Control

WFA/Basin state in their Opening Narrative that they equipped the LRR with a Centralized Traffic Control (CTC) System at a total cost of $49.2 million. WFA/Basin Opening Nar. at III-F-81 and Table III-F-8. This cost covers the dispatching center, interlockings and allegedly all the necessary components and accessories. In addition, they included $0.58 million for FEDs. On May 3, 2005, WFA/Basin filed their Errata in which they provided revised electronic spreadsheets for their signal and communications costs in order to provide a linked version of their workpaper "Laramie River C&S.xls."

BNSF Engineering Consultants reviewed the Errata spreadsheet and found that there were a number of discrepancies, errors and omissions in the quantities in that spreadsheet. First, WFA/Basin omitted a crossover control point at Milepost 14 on the Orin Subdivision, and instead have included an automatic signal at this location. BNSF Engineering Consultants corrected this error by replacing the automatic signal with a crossover control point.

Second, there were a number of instances where the quantities stated by WFA/Basin were inconsistent with WFA/Basin's signal schematic plan. One example is "CP F 223" where WFA/Basin included four signals although the schematic shows only three and BNSF agrees that only three are required at that location. BNSF Engineering Consultants corrected this and other similar inconsistencies.

Third, in several instances WFA/Basin's quantities of signals and signal huts were deficient. For example, on control point "CP C 65," WFA/Basin included only one hut capable of handling four signals, whereas WFA/Basin installed five turnouts at that location. BNSF Engineering Consultants corrected this and other similar errors.

All of these types of corrections to WFA/Basin's evidence are shown highlighted in BNSF's Reply electronic workpaper "III F 6 CTC.xls," worksheet "Locations & Counts."

In addition, WFA/Basin understated their costs by failing to include insulated joints at intermediary signals. BNSF Engineering Consultants corrected this error by adding one joint per signal.[225]

WFA/Basin also failed to include costs for Independently Controlled Switches (ICS) within crossovers. BNSF has currently made this their standard on the Orin Subdivision because without them, when one of the two turnouts within a crossover is shut down, the other turnout would present a red signal as well. For efficiency, traffic must continue to flow on the adjacent track when one track is out in order to maintain traffic flows and meet required cycle times. Therefore, BNSF uses ICS not only on its double track segments, but even in its triple track areas. As WFA/Basin have designed the LRR with mostly double track, ICS is essential as the failure to install ICS would result in completely shutting down LRR operations. Indeed, WFA/Basin assumed ICS for crossovers in their RTC model for the LRR (as did BNSF capacity witnesses) because even when random outages were incorporated into the RTC model, the traffic was allowed to flow on the adjacent track. BNSF Engineering Consultants, therefore, have

[225] WFA/Basin address insulated joints in various portions of their electronic workpapers. Their quantity is calculated in their Section III F 6 spreadsheets, their material price in "III - F TOTAL.xls,," worksheet "Material Unit Cost" and their labor in "III - F TOTAL.xls," worksheet "TOTALS." For consistency, BNSF Engineering Consultants have adopted that methodology.

included the additional cost of $110,000 per crossover for ICS in their restatement of signal costs.

In addition to correcting WFA/Basin's errors, BNSF Engineering Consultants have also increased the quantities of signal components to account for the additional setouts for DEDs that are required as a result of BNSF's use of concrete ties rather than wood ties on the LRR, as discussed in Section III.F.3.c. BNSF Engineering Consultants used the same methodology for determining the signal costs associated with the DEDs as WFA/Basin used for the FED setouts, including the use of solar power, as discussed in section III.F.6.a.(2) below.

WFA/Basin obtained multiple quotes for the unit prices for the components for the LRR signal system. Except for the fact that WFA/Basin did not index any of the prices, BNSF accepts the unit costs for all components other than the cost for commercial power drops. WFA/Basin used a unit cost of $3,500 per power drop for commercial power drops and cite the source for that cost as "*AEP Texas* (Revised)." However, the *AEP Texas* cost per power drop was { }. WFA/Basin provided no explanation as to how or why they revised the *AEP Texas* cost. In developing their microwave costs, WFA/Basin also used the *AEP Texas* (BNSF Reply evidence) power drop cost, but in this case, used the correct unit cost of ${ } for their tower equipment estimate.[226] As WFA/Basin have provided no support for their revision of this unit cost, BNSF Engineering Consultants have used the ${ } unit cost from *AEP Texas* for power drops, indexed to 4Q2004, for control points.

In developing their installation costs, WFA/Basin used an hourly rate of ${ } for an inspector and ${ } for a helper without any backup or explanation of those rates. BNSF Engineering Consultants compared those rates with BNSF's Wage Form A produced in

[226] WFA/Basin Errata electronic workpaper "LRR microwave LMR cost development.xls," worksheet "Per Tower Equipment."

discovery and agree that they are sufficient to cover salaries, fringe benefits, small tools and supplies, and the use of a crew truck.

(2) Detectors

To prevent damage to trains and track as a result of equipment failures, railroads install detectors along the route to identify and remove problem equipment before any damage occurs. Hot bearing detectors (HBDs) notify the crew when roller bearings are overheated. Dragging equipment detectors (DEDs) alert the train crew to defective and/or dragging equipment that could cause the train to derail or cause damage to the track, bridge or tunnel structures. Combined HBD/DED detectors are referred to as Failed Equipment Detectors (FEDs).

WFA/Basin Witness Grappone installed automatic roll-by FEDs at eight locations along the LRR, approximately every 25 miles along the mainline and generally where they exist on the BNSF. BNSF Engineering Consultants agree with the locations. As discussed in Section III.F.3.c, BNSF Engineering Consultants have constructed the LRR with the same types of ties as those used on the BNSF lines being replicated. When using concrete ties, DEDs need to be placed every five miles. Therefore, BNSF Engineering Consultants used the same number of DEDs that are currently used on these lines, in accordance with the criteria set out in the file "FED Site Criteria.doc" that was provided to WFA/Basin in discovery.[227]

BNSF provided a list of the actual locations for detectors and BNSF Engineering Consultants located the additional DEDs for the LRR near the same locations as BNSF has them today. This resulted in adding 28 DED locations and 45 detectors, as shown in BNSF Reply electronic workpaper "III F 6 FED Locations.xls." The highlighted mileposts are the locations where additional DEDs were added on the LRR.

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[227] BNSF Reply electronic workpaper "DED.pdf."

The installed DED unit cost of ${ } is taken from BNSF AFE A044610[228] provided to WFA/Basin in discovery, which contains BNSF's material cost for a dragging equipment detector and hours for installation. BNSF Engineering Consultants used the estimated hours of installation from the AFE to develop the installation costs. A 12-volt battery, solar power and cables for each DED location were added to the materials cost. BNSF Engineering Consultants accepted the unit costs for these items that were developed by WFA/Basin for application to FEDs and applied them to the DEDs as well. The BNSF restated costs are shown in BNSF Reply electronic workpaper "III F 6 CTC.xls."

(3) Crossing Signals

WFA/Basin signalized all the crossings that are currently signalized on the existing BNSF lines replicated by the LRR. WFA/Basin used a unit cost of $9,700 for gates and flashers obtained from a supplier.[229] However, WFA/Basin did not include any insulated joints at protected at-grade crossings. BNSF Engineering Consultants have added four joints per each track crossing.

BNSF's total restated cost for the LRR Signal System is $58.9 million.

b. Communications System

In their Opening evidence, WFA/Basin included $8.7 million for the LRR communications system.[230] This system, as configured by WFA/Basin, includes microwave

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[228] BNSF Reply electronic workpaper "DED.pdf."

[229] WFA/Basin electronic workpaper "Laramie River C&S Spreadsheet.xls," worksheet "Components and Tabulation"

[230] WFA/Basin Opening electronic workpaper "III - F TOTAL.xls."

towers, microwave base stations, microwave antennas, microwave network management system, Land Mobile Radio (LMR) base stations and multiplexors.[231]

The backbone of this communications network is a series of microwave towers generally placed in close proximity to those of BNSF on the replicated lines. WFA/Basin utilized BNSF's own layout to ensure full coverage. WFA/Basin Opening Nar. at III-F-86. Microwave towers are spaced at approximately 10 miles, *id.*, and towers are designed at heights ranging from 25 feet to 200 feet. The microwave towers are equipped with multiple antennae and each tower includes an LMR base station and corresponding radio equipment. WFA/Basin selected the Alcatel MDR-8606 microwave base station as the primary technology, which is a six GHz, high capacity radio that facilitates transmission capacity of "three x DS3." The LMR base station selected by WFA/Basin is a Motorola MTR2000 that will operate in VHF mode for transmitting and receiving.[232] The components of the microwave and LMR systems are set out in WFA/Basin's electronic workpaper "Laramie River C&S Spreadsheet.xls."

BNSF Engineering Consultants generally agree with the design of the LRR communications system. However, they take issue with the numerous inconsistencies and unsupported unit costs in WFA/Basin's electronic workpapers.

WFA/Basin developed the costs for the components of the LRR network from a variety of sources, including the Alcatel Pricing Manual, the Colorado Order Guide, and Western State

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[231] WFA/Basin Opening electronic workpaper "LRR Microwave LMR cost development.xls."

[232] *Id.*

Contracting Alliance Current Contract Information.[233] In many instances, WFA/Basin purport to give the source of their unit costs for each component in their spreadsheet, but the unit costs bear no resemblance to the costs in the sources cited. WFA/Basin included, as workpapers, hundreds of pages of documents from which their costs were allegedly drawn. The documents included multiple quotes for the same item. Attempting to find WFA/Basin's unit cost from the hundreds of hard copy documents (in pdf files) was extremely difficult and in many instances futile. BNSF in its workpaper requests asked for support for the unit costs in electronic workpaper "LRR Microwave LMR cost development.xls," but no additional guidance was supplied. WFA/Basin provided the name of the particular supplier in the "Source" column for each unit cost, but there was no link to that source and the name of the pdf file where that supplier's quote could be found was not given. Some of the more egregious inconsistencies are discussed below.

(1) Microwave Base Station

WFA/Basin's electronic workpaper "LLR Microwave LMR cost development.xls," worksheet "Communications Equip." is riddled with inconsistencies. The microwave base station listed in the spreadsheet is an Alcatel MDR-8606-6 GHz with a Model ID of MDR-8606-6-135-31-(). The source given for this item is "Colorado 72536YYY02P: S ColoOrderGuide8000-2003.pdf." Those files, however, were not provided. In response to BNSF's workpaper request, WFA/Basin provided a CD with additional workpaper files, including "S-C Workpapers 3.pdf." Document "S ColoOrderGuide8000-2003.pdf" and another source document "Pricing.pdf" were included among the 67 pages of "S-C Workpapers 3.pdf." But even locating the appropriate documents did not provide the back up for WFA/Basin's unit cost. On the source document for the microwave base station, WFA/Basin had marked a unit

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233 WFA/Basin Opening electronic workpapers Subfolder "Workpapers" in Folder "III-F-6."

cost of $38,433, but the unit cost included in their costing spreadsheet was $27,850. The embedded formula for that cell indicated that the unit cost was "55700*.5" but no explanation was given. In this and other instances where the source cited provides a unit cost other than that used by WFA/Basin, BNSF Engineering Consultants have used the unit cost contained in the source document. Therefore, in its restatement of communications costs, BNSF uses $38,433 as the unit cost for the microwave base station.

WFA/Basin also failed to index the 2003 prices to 2004. In their restatement, BNSF Engineering Consultants have corrected all indexing errors.

(2) <u>Microwave Radio Antennae</u>

In the "Communications Equip." spreadsheet, WFA/Basin list a unit cost of $1,476 for the microwave radio antenna described as an "8' Dual Polarized Antenna – 6 GHz" with a Model ID PXL8-65D. They list Radian as the source. The only price list for Radian products is included in the 235-page Western States Contracting Alliance Current Contract Information, identified in WFA/Basin's electronic workpapers as "02702C.doc." That Radian document provides unit costs for microwave towers, but contains no cost information for antennae. BNSF Engineering Consultants did find a unit cost for that model in the Colorado 84010YYY02P document included in WFA/Basin's electronic file "S-C Workpapers 3.pdf," but that document provided a 2002 cost of $1,987.20.

WFA/Basin did not link the unit costs they calculated in the electronic file "LRR Microwave LMR cost development.xls," worksheet "Communications Equip" to their spreadsheet "Laramie River C&S spreadsheet.xls," worksheet "Components and Tabulation" when determining their overall communications costs. In the latter spreadsheet, WFA/Basin reference Radio Frequency System as the source for the antenna unit cost. Radio Frequency System antenna costs were found in "02702C.doc" but there were no costs correlating to the antenna type listed in the "Communications Equip." worksheet. Therefore, BNSF Engineering Consultants used the unit cost $1,987.20 from the Colorado document indexed to 4Q2004. They also included the assembly mount cost listed for that antenna. WFA/Basin correctly included two antennae per base station in their costs and BNSF's restatement includes two antennae per base station as well.

(3) Land Mobile Radio

The same inconsistency described in the above subsections occurs with the LMR base station. The price listed in worksheet "Communication Equip." for a Motorola base station MTR2000 with Model ID T5544X30 is $3,858.05 and the source is identified as "Colorado 72584YYY06M: Pricing.doc." The source cited, however, has a unit price of $4,469. Therefore, BNSF Engineering Consultants used the latter price indexed to 2004. This occurred with other components of the LMR as well. WFA/Basin listed a Voting Comparator System (T1726 8 RX Shelf) from Air-Comm for $700, but BNSF Engineering Consultants could not identify any source for that price. Although the file "S-C Workpapers 2.pdf" contains a record of a telephone call with Air-Comm giving a unit cost of $100 each for "chassis, power and command module" for the Voting Comparator System, there is no explanation of how WFA/Basin derived their cost of $700. Since the Motorola price list BNSF used for the base station also included a price for a Voting Comparator System having the same model number as that specified in WFA/Basin's spreadsheet, BNSF Engineering Consultants used that price of $1,201.50 in their restatement, rather than WFA/Basin's unsupported price of $700.

In other instances, the sources cited by WFA/Basin were not easily identified. For example, WFA/Basin listed the VHF Duplexer (Model X182) and the Desktop Remote Control (L3146) with unit costs of $1,380 and $417, respectively, giving Motorola as the source. BNSF

Engineering Consultants ultimately found unit costs for those models buried in the documents in workpaper "S-C Workpapers 2.pdf."

(4) Multiplexor Equipment

WFA/Basin listed several components of the Multiplexor Equipment in "Communications Equip." BNSF Engineering Consultants accept the 2003 unit costs for those items, but indexed them to 2004.

(5) Microwave Tower Dehydration Equipment

In WFA/Basin Errata electronic workpaper "LRR Microwave LRM cost development.xls," worksheet "Per Tower Costs," WFA/Basin listed a unit cost of $1,254.18 for unspecified dehydration equipment with Radian listed as the source. BNSF Engineering Consultants could find no cost from Radian for such equipment. However, the Colorado 84010YYY02P document in "S-C Workpapers 3.pdf" that was the source of the antenna cost also provided a cost for dehydration of $1,622.11. BNSF used that cost indexed to 4Q2004.

(6) Communications Shed

In WFA/Basin Errata electronic workpaper "LRR Microwave LMR cost development.xls," worksheet "Shed," WFA/Basin listed various components of the communications shed equipment. BNSF Engineering Consultants accept WFA/Basin's Opening Evidence on shed costs, except that they index the 2003 costs to 4Q2004.

(7) Towers

In WFA/Basin Errata electronic workpaper "LRR Microwave LMR cost development.xls," worksheet "Per Tower Equipment," WFA/Basin listed various types of tower-related costs. BNSF Engineering Consultants accept the majority of the tower-related cost, with the exception of a few of the unit costs for cable and waveguide that could not be located under the sources listed. For those items, BNSF relied on other source documents provided by WFA/Basin in their Opening Evidence.

(8) Summary

BNSF has accepted the WFA/Basin unit costs for which backup support could be found. For those items where the source listed by WFA/Basin provided a different unit price, BNSF used that price. In a few instances where BNSF could match neither price nor source for an item, BNSF relied on other documents provided by WFA/Basin. The result is that BNSF's restatement of communications costs is only slightly higher than WFA/Basin's Opening costs. BNSF's total communications costs are $9.9 million.

The table below compares BNSF's total communications cost to those of WFA/Basin. Details of the equipment selected and the unit costs for the equipment are included in BNSF workpapers.[234]

Table III.F.6-1
Comparison of BNSF and WFA/Basin
LRR Communications Costs

Description	BNSF $million	WFA/Basin $million	Difference $million
Microwave System	$8.0	$6.9	$1.1
Radios[1]	$1.9	$1.8	$0.1
TOTAL	**$9.9**	**$8.7**	**$1.1**

Source: BNSF Reply electronic workpaper "III F 6 CTC.xls," worksheet "Components & Tabulation;" WFA/Basin Errata electronic workpaper "Laramie River C&S Spreadsheet.xls."

7. Buildings and Facilities

This section presents BNSF's response to WFA/Basin's Opening Evidence with respect to the cost to construct the following structures:

a. Headquarters Building

[234] BNSF Reply electronic workpapers "III F 6 CTC.xls," worksheet "Components & Tabulation; " and "Communications.pdf."

b. Locomotive Fueling Facilities
c. Locomotive Shop
d. Car Repair Shop
e. Crew Change and Yard Office Buildings
f. Maintenance of Way Buildings
g. Wastewater Treatment Facilities
h. Yard Air and Yard Lighting

In their Opening Evidence, WFA/Basin presented a summary of the general purpose, and locations of buildings and facilities on the LRR,[235] but they did not provide specific information with respect to the methods and materials to be used in the construction of these buildings and facilities. In fact, WFA/Basin's Opening Evidence and workpapers are riddled with errors, omissions and inconsistencies.

Some of these discrepancies are minor, such as using the wrong containment pipe for the diesel fuel lines for the locomotive fueling facilities[236] or incorrectly calculating location adjustment factors for the headquarters and MOW buildings.[237] Others are major -- for example (1) WFA/Basin ignored the unit costs for the tank farm contained in their workpaper "Wilson Company e-mail.pdf" ($2.25 to $2.50/gallon of diesel fuel storage) and proposed instead a unit cost for diesel fuel storage of $0.82/gallon,[238] and (2) WFA/Basin provided costs for facilities for which they failed to develop even a conceptual design (*e.g.*, the Guernsey locomotive fueling

[235] WFA/Basin Opening Nar. at III-F-87 through III-F-99.

[236] WFA/Basin Opening electronic workpaper "Fuel Storage Cost.xls," worksheet "Mainline Fueling."

[237] WFA/Basin Opening electronic workpaper "Buildings and Sites.xls," worksheet "Location Factor."

[238] See WFA/Basin electronic workpaper "Fuel Storage Costs.xls," worksheet "Total Fuel Costs" (Total for tanks and containment (e.g. sum of cells C56, C57 and C58) divided by 1.1 million gallons).

facilities, locomotive wash house). These numerous errors and omissions undermine the credibility of WFA/Basin's building designs and construction costs.

In order to present a comprehensive accounting of the facilities needed to operate the LRR, BNSF Engineering Consultant James Primm performed the following tasks, each of which is discussed more fully in the subsections below:

- Headquarters Building. The construction unit cost for the headquarters building based on the notarized Certificate of Payment for a 21,500 SF building in Pennsylvania[239] used by WFA/Basin was accepted, except that WFA/Basin's incorrect application of the location factor was corrected and an emergency generator was added.

- Locomotive Fueling Facilities. A conceptual design was created for the fueling facilities at Guernsey based on the general description of the facility presented in WFA/Basin's Opening Narrative at III-F-88. Facilities necessary for the full and complete operation of the fueling facility, but omitted in WFA/Basin's Opening Narrative and workpapers, were added. Errors and omissions in WFA/Basin's construction costs were corrected. Unit prices for similar facilities were multiplied by the quantities of construction materials and equipment to develop the cost of this fueling facility. These unit prices were adjusted to 4Q2004.

  For the locomotive fueling facilities at locations where helper locomotives are based (Campbell and MP 15.0), a conceptual design was created based on fueling locomotives from a tank truck. A containment structure with a small sump is provided at these locations to contain fluid spills. Unit prices for similar facilities were multiplied by the quantities of construction materials and equipment to develop the cost of these fueling facilities. These unit prices were adjusted to calendar year 2004.

- Locomotive Maintenance Shop. A conceptual shop design was created that corrects the deficiencies and omissions in shop facility and equipment proposed by WFA/Basin. The revised conceptual design is in accordance with design criteria of the American Railway Engineering and Maintenance-of-Way Association (AREMA) for locomotive shops and complies with locomotive

[239] WFA/Basin Opening electronic workpaper "Headquarters.pdf."

maintenance concepts commonly accepted in the railroad industry. The conceptual design is based on the shop area provided by WFA/Basin[240] and incorporates design concepts included in locomotive maintenance facilities designed for the BNSF at North Kansas City, Missouri; Chicago, Illinois; Topeka, Kansas; Barstow, California; Commerce, California, and the Union Pacific Railroad at Hermiston, Oregon. Construction costs for the locomotive maintenance shop were developed using current budget quotations from equipment manufacturers and RS Means unit prices. The unit costs were then multiplied by estimates of quantities of required construction materials and equipment taken either from design drawings of the facilities or estimated based on WFA/Basin's floor plan of the proposed locomotive shop.[241] The detailed construction cost estimate for the LRR locomotive shop includes all support facilities necessary for a fully functional shop. Where necessary, construction prices were adjusted to fourth quarter 2004.

- Railcar Maintenance Facility. The shop to repair railcars will be provided by an independent contractor. WFA/Basin Opening Nar. at III-F-90. BNSF operating witnesses accept this arrangement so Mr. Primm did not prepare a conceptual design for a railcar maintenance facility.

- Crew Change and Yard Office Buildings, and MOW Buildings. Costs were re-calculated based on adjusted square-foot construction costs provided by WFA/Basin.

- Wastewater Treatment Plant. A dissolved air flotation system was added to the wastewater treatment plant that will serve the mechanical facilities. The wastewater treatment facilities proposed by WFA/Basin are equipped and sized for treatment of sanitary waste, not industrial wastewater. For other locations where crew change and yard office and MOW buildings are to be constructed, costs were developed for either a connection to the publicly owned treatment works or septic disposal system. Construction costs were developed by using cost data from RS Means (indexed to 4Q2004 unit prices) multiplied by detailed estimates of quantities of construction materials and equipment. The model for the

[240] WFA/Basin Opening Nar. at III-F-94; electronic workpaper "Locomotive Shop Floor Plan.pdf."

[241] WFA/Basin Opening electronic workpaper "Locomotive Shop Floor Plan.pdf."

wastewater treatment plant is the wastewater treatment plant built with the Hinkle Locomotive Repair Facility.[242]

In each of the following subsections, BNSF Consultant Primm critiques WFA/Basin's design and costing of the particular building or facilities and restates the costs.

The table below summarizes BNSF's restatement of costs for buildings and facilities on the LRR.

Table III.F.7-1
Comparison Of BNSF's Estimated Of Facilities Cost
To WFA/Basin's Opening Estimate ($Millions)

	BNSF (millions)	**WFA/Basin (millions)**	**Difference (millions)**
Fueling Facilities	$16.92	$12.95	$3.97
Wastewater Treatment Plants	$1.75	$0.54	$1.18
Locomotive Shop	$27.11	$8.58	$19.53
Car Repair Facilities	$0.0	$0.0	$0.0
Headquarters/Yards	$2.82	$2.48	$0.34
MOW/Roadway Buildings	$3.12	$2.21	$$0.91
TOTAL*	**$51.65**	**$26.76**	**$24.89**
Yard Sites	**Included in Grading Costs**	**$14.67**	

* The totals may not represent the sum of the parts due to rounding.
Source: BNSF Reply electronic workpaper "III F 7 Facilities.xls," worksheet "Summary." WFA/Basin Errata electronic workpapers "Buildings and Sites.xls," worksheet "Total Building Cost" and "Fuel Storage Cost.xls," worksheet "Total Fuel Costs."

a. Headquarters Building

WFA/Basin state that their headquarters facility at Guernsey is a 21,500 square-foot, three-story building based on an actual building constructed in Darlington, PA and that the building quote "includes all site work and a full complement of equipment, such as an elevator, sprinkler, fire alarms and even entrance mats." WFA/Basin Opening Nar. at III-F-88. BNSF

[242] Mr. Primm prepared the conceptual design and supervised the detailed design of the Hinkle Locomotive Repair Facility at Hermiston, Oregon.

Engineering Consultants agree that this size building is appropriate as a basis for costing the LRR headquarters.

WFA/Basin developed their square foot unit cost for the headquarters building using the final Application and Certificate for Payment, dated September 20, 1999, from the contractor, Kessel Construction, Incorporated[243] divided by the total square feet of that building. They then indexed the unit cost to 4Q2004 and applied a location factor to convert the construction cost of the headquarters from Darlington, PA to Guernsey, WY. BNSF Engineering Consultants accept WFA/Basin's use of the Location Factor for New Castle, PA (0.96) for Darlington, PA and the Location Factor of Wheatland, WY (0.75) for Guernsey, WY,[244] but disagree with the computation used to convert the construction cost of the headquarters building from Darlington, PA to Guernsey, WY[245] and with the computation used to adjust the building costs to 4Q2004. BNSF witness Mr. Primm corrected the indexing and location factor and used the total adjusted cost per square foot of $119.31 to calculate the cost of the headquarters building, which he increased slightly, based on BNSF's restatement of personnel requirements.

WFA/Basin omitted from their calculations of costs for the headquarters building an emergency generator with fuel storage tank for support of critical functions (computers, dispatch center) (IBC Section 403.10). BNSF has corrected that omission.

BNSF Engineering Consultants accept WFA/Basin's methodology and pricing for calculation of costs of site grading, drainage, and parking lots and use the unit costs in their calculations for these construction items. However, as discussed in more detail in Section

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243 WFA/Basin electronic workpaper "Headquarters.pdf."

244 WFA/Basin electronic workpaper "HQ_and MOW Buildings Location Factor.pdf."

245 The correct computation is to multiply the Darlington cost by (0.75/0.96=0.7813).

III.F.7.h, Mr. Primm takes issue with WFA/Basin's costs for site lighting because WFA/Basin's cost calculations contain several errors.[246] He has corrected WFA/Basin's errors in his restatement of site lighting costs.

BNSF's restated construction cost of the headquarters building is $2,823,256. Calculations are shown in BNSF's electronic workpapers.[247]

b. Fueling Facilities

As discussed more fully in the subsections below, WFA/Basin's evidence on fueling facilities suffers from the following errors and omissions:

- WFA/Basin failed to provide a conceptual drawing to allow analysis of their design for the locomotive fueling facility, which makes it difficult to evaluate the adequacy of the design and costs.
- WFA/Basin omitted numerous items of necessary equipment from their costs of the Guernsey locomotive fueling facilities.
- WFA/Basin's choices of fuel pump and lubricating oil pump are inadequate to provide the necessary pressures to support WFA/Basin's stated flow rates.
- WFA/Basin proposed a 1,500 SF pump house, which is too small to accommodate all of the maintenance fluid distribution pumps, water softening equipment and radiator water injection equipment.
- WFA/Basin ignored budgetary pricing from Wilson Company's e-mail for tank farm costs and thus understated storage costs.
- WFA/Basin's electronic workpaper "Fuel Storage Costs.xls," worksheets "Inside Fueling," "Mainline Fueling," and "Total Fuel Costs" contain multiple errors.

[246] WFA/Basin Opening electronic workpapers "Building Site Costs.xls," worksheet "Develop Unit Costs;" "390.pdf;" and "391.pdf."

[247] BNSF Reply electronic workpapers "III F 7 Facilities.xls," worksheet "Headquarters."

(1) Design

In their Opening evidence, WFA/Basin provide two locomotive fueling facilities at Guernsey, a mainline facility capable of fueling four locomotives simultaneously and an "inside" facility capable of servicing 12 locomotives simultaneously. WFA/Basin Opening Nar. at III-F-90 to 91. The only descriptions of these facilities are those contained in WFA/Basin's Opening Narrative. WFA/Basin provided no sketches, or conceptual drawings of their locomotive fueling facilities thereby making a critique of their design difficult.

At each of these facilities, WFA/Basin provided equipment to dispense diesel fuel, engine lubricating oil, and water, but omitted essential equipment for dispensing air compressor oil, radiator water, and other maintenance fluid systems. All of this omitted equipment is necessary to prevent a locomotive from unnecessarily being removed from a train, and is equipment typically found at BNSF mainline fueling and service track fueling facilities. WFA/Basin's assumption that the only fluids necessary to operate a locomotive are diesel fuel, engine lubricating oil, and water is absurd.

Locomotive maintenance requirements are established by the manufacturer of the locomotive to ensure that the locomotive functions reliably. It is the responsibility of the railroad to provide the necessary facilities to enable the locomotives to be properly maintained in accordance with the locomotive manufacturer's recommended practices and procedures and to comply with the FRA requirements that locomotives be inspected for compliance with the federal locomotive safety regulations on a 92-day cycle, in addition to daily safety inspections.

Because a locomotive is a very valuable asset (an SD-70MAC locomotive costs approximately $2.0 million), it is in the economic best interest of its owner or operator to provide servicing and maintenance facilities that will allow the efficient and expeditious servicing, inspection and repair of the locomotive in order to maintain locomotive availability rates above

95 percent. Railroads, both individually and through AREMA, have established design criteria for locomotive fueling facilities and locomotive maintenance shops for the express purpose of sharing the accumulated wisdom and knowledge of locomotive maintenance professionals with respect to methods and procedures proven to cause locomotives to be efficiently and expeditiously serviced, inspected, and repaired. WFA/Basin ignore these criteria and propose locomotive fueling facility designs that are inadequate to properly maintain the locomotive fleet.

The fundamental design criterion for a locomotive fueling facility is to provide all of the necessary equipment to enable the locomotive to be returned to productive service in the minimum amount of time. Maintaining a fleet of high-utilization, high-mileage locomotives requires significantly more maintenance effort than is necessary to maintain 14 low-mileage locomotives where the maintenance facility need only accommodate two inspections per week, such as that upon which WFA/Basin relied.[248]

The following maintenance fluids essential to proper locomotive maintenance were omitted from WFA/Basin's locomotive facility design and costs:

- Air Compressor Lubricating Oil. As the description implies, the locomotive air compressor requires lubricating oil in order to properly operate. Lack of lubricating oil will result in seizure of the air compressor and loss of compressed air to the locomotive and train braking systems. Also, in the case of automated bottom-discharge coal hopper cars, the source of compressed air to operate the hopper door operating mechanism would be lost.

- Radiator Cooling Water. As in an automobile, coolant is required to carry away excess heat of combustion from the diesel engine. The cooling water is treated with a sodium borate compound to prevent formation of rust in the radiators and piping of the locomotive's cooling system. This system is different from a potable water distribution system.

- Sanitary Sewage Disposal. Locomotive toilet retention tanks must be periodically emptied into a sanitary sewer collection system and then conveyed to a treatment

[248] WFA/Basin Opening electronic workpaper "UP-Phoenix Maintenance Costs.pdf."

plant for treatment and disposal. Systems for dispensing toilet chemicals to control odor and prevent unsanitary conditions, and glycol to prevent freezing in cold weather are also required.

- Methanol. Methanol is added to locomotive fuel to improve combustion.

- Compressed Air. Compressed air is required to operate the Dynamic Air Corporations pneumatic locomotive sanding system. Therefore an air compressor, receiver tank, and air dryer are required.

- Soap. Soap is typically distributed throughout the locomotive maintenance facilities to aid in cleaning spills in order to provide a safe working environment for the employees.

- Waste Oil. Waste oil must be collected from the oil/water separator at the locomotive fueling facilities or maintenance shop.

Mr. Primm's design for the LRR fueling facilities includes the addition of these maintenance fluid systems and all of the ancillary equipment needed for them, including distribution piping, dispensing cabinets and hoses, receiving and distribution pumps, and storage tanks, injection systems, sanitary collection stations and connections to Publicly Owned Treatment Works (POTW). He also included heat tracing and pipe insulation to insulate each fluid distribution line to prevent it from freezing.

A canopy was provided over fueling platforms and maintenance fluid delivery areas to segregate storm water from waste water to limit the flow of effluent to the Guernsey POTW. The Guernsey POTW is presently constrained in its capacity and would be unable to accept effluent from LRR's facilities.

WFA/Basin proposed a 1,500 square foot pump house to house their two diesel fuel pumps and two lube oil pumps. Mr. Primm accepts the use of the 1,500 square foot pump house to house the two diesel fuel pumps, but relocated the lube oil pumps to a separate 3,600 square foot pump house located next to the locomotive maintenance shop. This pump house is sized to accommodate all of the pumps and motors associated with the fluid distribution systems omitted by WFA/Basin. This is the same size pump house designed for the UP to support its locomotive maintenance facilities at Hermiston, Oregon.

BNSF's critique of the wastewater collection and treatment system at the fueling facility is included in its discussion of the WFA/Basin's system wastewater treatment design in Section III.F.7.g.

In order to correct these and other errors and omissions in WFA/Basin's design of the LRR fueling facilities, Mr. Primm developed a conceptual design based on the LRR requirements determined by BNSF operating witness and meeting the recommended practices of AREMA.[249] The conceptual design was based on WFA/Basin's narrative description of their fueling facilities. The conceptual design complies with all federal, state and local storm water discharge and treatment regulations. The costs for the facility include fuel spill containment at locomotive fueling tracks, fuel delivery tracks, tank truck delivery areas, storage tanks, sanding equipment, fuel dispensing equipment, lubricant and engine combustion additive dispensing systems, and storm and waste water collection and treatment facilities.

(2) Fuel Facilities Costs

(a) Main Line Fueling Platform

WFA/Basin used costs provided by Mr. Kenny Hancock of Wilson Company in their calculation of locomotive fueling facilities costs. The Wilson quote for a fueling facility included the costs for two-track fueling platforms, but did not include all of the necessary components involved in construction of fueling facilities. A fully functioning fueling facility requires the following:

1. Site utilities including sanitary and industrial wastewater sewers, storm water collection, water, natural gas, and electrical service, including an electrical substation

[249] BNSF Reply electronic workpaper "Fueling Facilities.pdf."

2. Connections to utilities
   - Sanitary sewer
   - Wastewater sewer
   - Water
   - Natural gas
   - Electricity
3. Grading for the fueling facility
4. Parking areas for personnel or maintenance vehicles
5. Support building for locomotive service personnel and material storage, including office, lunch room, restrooms and warehouse
6. Lubricating oil, air compressor oil, toilet chemical, glycol, methanol, and soap unloading facility
7. Fire suppression system at diesel fuel storage tank
8. Storage tanks for lubricating oil, air compressor oil, toilet chemical, glycol, methanol, waste oil, and soap
9. Concrete containment structure enclosing storage tanks holding locomotive lubricating oil, journal oil, air compressor oil, glycol, methanol, soap, and toilet chemical
10. Pump house for distribution of fuel, locomotive lubricating oil, air compressor oil, waste oil, radiator water, glycol, methanol, soap, and toilet chemical from unloading facility to storage tanks and fueling platforms. The pump house also houses locomotive radiator water preparation equipment
11. Diesel fuel, lubricating oil, air compressor oil, compressed air, glycol, methanol, soap, and toilet chemical dispensing lines at fueling platforms
12. Waste oil collection lines
13. Sand unloading, storage, distribution and dispensing facility
14. Compressed air system to operate Dynamic Air Conveying Corporation's sanding system
15. Industrial wastewater treatment plant and connection to existing publicly-owned sewer system
16. Sanitary waste collection and treatment and discharge to existing publicly-owned sewer system
17. Storm water retention and treatment or discharge to existing publicly-owned sewer system.

The Wilson Company provided an estimate of $320,000 per fuel crane as the basis for calculating the cost of the fueling platform (based on a two-track fueling platform arrangement). This per fuel crane construction price includes only the following components listed in the Wilson Company e-mail:

- Reinforced concrete fueling platform
- Platform pipe trenches
- Diesel fuel, lubricating oil, air compressor oil, and water piping on platform

- Diesel fuel dispensing stations on platform
- Lubricating oil dispensing stations on platform
- Air compressor oil dispensing stations on platform
- Water hydrants on platform
- Platform electrical power distribution system
- Pump and electrical control system on platform
- Direct rail fixation to concrete track structure for full length of fueling platform.[250]

Mr. Primm accepts the Wilson quote for the components that it covers, but separately calculated the costs for items that were omitted, and corrected errors and inconsistencies in WFA/Basin's costs. In addition to the omission of costs associated with the maintenance fluid distribution and storage systems discussed above, there are numerous other discrepancies, omissions and errors in WFA/Basin's costs for their mainline fueling facility. For example, WFA/Basin proposed using a diesel fuel pump with a flow rate that is inadequate for the LRR. The Blackmer Model HXL8G fuel pump proposed by WFA/Basin has a flow rate of 1,070 gpm and operating at 55 psi,[251] whereas fuel pumps in similar service normally operate at 125 to 150 psi.[252] The higher pressure allows better flow. WFA/Basin omitted the costs of ancillary equipment such as fuel filters and strainers, shutoff and pressure release valves, controls including pressure switches and thermocouples, meters, expansion tank, gear reducer and programmable logic controller.

WFA/Basin's lube oil pump is also inadequate. As best can be determined, the Blackmer XLRF pump has a flow rate of from 9 to 17 gallons per minute (gpm) depending on motor speed, which would require from 25.6 to 48.5 minutes to fill the crankcase of an SD-70MAC (436

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[250] WFA/Basin Opening electronic workpaper "Hanson Co email.pdf."

[251] WFA/Basin Opening electronic workpaper "Diesel Fuel Pump.pdf."

[252] BNSF Reply electronic workpaper "Fuel Pump Spec.pdf."

gallons). Normally, lube oil dispensing pumps of 75 gpm capacity are used. WFA/Basin also omitted the costs for a motor and controls for the lube oil pump and a pump, motor, and controls to re-circulate the lube oil through the dispensing system.

There are major contradictions between WFA/Basin's description of locomotive sanding requirements for their Main Line Fueling Facility contained in their Opening Narrative at page III-F-91 and what they presented in their electronic spreadsheet "Fuel Storage Costs.xls." In their Opening Narrative, WFA/Basin stated that a locomotive sanding system is not required at their main line fueling facility, but on their spreadsheet, they show the costs of two sand towers with four spouts each. WFA/Basin would actually require three, not two, sanding towers to provide sand at their main line fueling facility, as shown in Mr. Primm's conceptual plan of the main line fueling facility.[253]

WFA/Basin relied on a quote from Monroe Engineering Company of Marion, Iowa for a cost of $116,253 for a 30-ton sand tower with two spouts.[254] The quote further provides that adding two additional spouts and three lights to the tower would increase its cost to $147,406.[255] However, WFA/Basin used a cost of $140,212 for the cost of the sand tower with four spouts and three lights, or $7,194 less than the Monroe Engineering price quotation.

Finally, WFA/Basin's electronic spreadsheet "Fuel Storage Costs.xls," worksheet "Main Line Fuel" contains multiple omissions of equipment and errors and/or unsupported unit costs that both overstate and understate the actual costs and as such could not be corrected. Therefore,

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[253] BNSF Reply electronic workpaper "Mainline Fueling Arrangement.pdf."

[254] WFA/Basin Opening electronic workpaper "Sand Tower.pdf."

[255] BNSF Reply electronic workpaper "Monroe Telephone Memo.pdf."

Mr. Primm designed the mainline fueling facility from the bottom up. His total cost for the facility is $7.6 million.

(b) Inside Fueling Platform

WFA/Basin's evidence on the Inside Fueling Platforms contains the same types of errors, omissions and inconsistencies as described above for the Mainline Fueling Facility. The only significantly different issue here is for the sanding towers. In their Opening Narrative, WFA/Basin described in detail a sanding system based on eighteen sanding modules with a pneumatic conveying system[256] and presented general arrangement drawings prepared by the manufacturer of the pneumatic sanding system in their workpapers.[257] However, on their cost spreadsheet for the inside fueling facility, they show the costs of six sand towers with four spouts each. Mr. Primm based his costs on the sanding system described in their narrative and drawings. As illustrated in Mr. Primm's conceptual plan of the sanding equipment at the inside fueling facility, fourteen sanding modules are required.[258] Compressed air is required to operate the Dynamic Air Corporations pneumatic locomotive sanding system. Therefore an air compressor, receiver tank, and air dryer are also required. System air pressure is maintained at 90 psig and air must dry to prevent coagulation of sand in the pneumatic piping and dispensing hoses. Mr. Primm has added in costs for these items, which WFA/Basin omitted.

As with their mainline fueling spreadsheet, WFA/Basin's electronic workpaper "Fuel Storage Costs.xls," worksheet "Inside Fueling" has numerous errors both overstating and understating costs and containing unsupported unit costs. Therefore, Mr. Primm has used his

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[256] WFA/Basin Opening Nar. at III-F-93 to 94.

[257] WFA/Basin Opening electronic workpapers "1-dmod.pdf" and "2-dmod.pdf."

[258] BNSF Reply electronic workpaper "Inside Fueling Facility Sanding Arrangement.pdf."

conceptual design to develop the costs for the Inside Fueling and Service Facility. His restated cost is $9.1 million.

(c) Fuel Storage

WFA/Basin did not include the total cost for two 100,000 gallon storage tanks in the fueling cost summary, thereby understating the cost of the fuel storage facilities. The cost of the Guernsey Main Storage, using their costs, should have been $982,418.96 ($591,154.24 + (2*$195,632.36)). Even with this adjustment, WFA/Basin's tank farm costs are understated. WFA/Basin provide 1,200,000 gallons of completely new diesel fuel storage for $982,418.96 (corrected total) or $0.82 per gallon. This is inconsistent with the typical costs provided in the Wilson Company memorandum ("Wilson Co e-mail.pdf"), in which Mr. Hancock stated that the cost to construct a new tank farm for diesel fuel storage ranges from $2.25 to $2.50 per gallon. WFA/Basin's cost estimate is only approximately 33 percent of the estimate provided by Mr. Hancock, the individual on whom WFA/Basin relied for locomotive fueling facility pricing. The principle reason for this discrepancy is that WFA/Basin omit necessary ancillary equipment and support facilities from their costs. The tank costs from RS Means also do not include meters, valves, tank level gauges, thermocouple wells, inspection access, safety switches or any other controls. Costs were omitted for pumping facilities for deliveries of diesel fuel by truck or railroad tank cars even though WFA/Basin state in their Opening Narrative at III-F-93 that these capabilities are provided. WFA/Basin also state that they will provide a separate pump house at each 100,000-gallon diesel fuel storage/day tanks (Page III-F-93), but they failed to include the cost of these structures in their costs for fuel storage.

(3) Summary of BNSF's Restatement

(a) Guernsey Fueling Facilities

In order to correct the errors and omissions contained in WFA/Basin's pricing of the Guernsey locomotive fueling facilities, BNSF Consultant Primm developed conceptual designs based on the LRR requirements determined by BNSF operating witnesses and meeting the recommended practices of AREMA.[259]

Mr. Primm accepted the Wilson Company quotation for the items that it covers.[260] He also accepted the Dynamic Air budget price quotation of $50,000 per pneumatic sand module.[261] Unit prices from RS Means were indexed to fourth quarter 2004[262] and then multiplied by the quantities of construction materials and equipment to develop the cost of the facilities. The result was then multiplied by the RS Means location factors.

These costs are shown on BNSF electronic workpaper "III F 7 Facilities.xls," worksheets "Fueling -- Mainline" and "Fueling -- Inside."

(b) Helper Fueling Facilities

WFA/Basin provided no fueling facilities for helper locomotives. Locomotive fueling facilities were added at locations where helper locomotives are used. Mr. Primm created a conceptual design based on fueling locomotives from a tank truck. The design provides for spill containment at all locations where helper locomotives are fueled by tank truck. This structure

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[259] BNSF Reply electronic workpapers "Mainline Fueling Arrangement.pdf" and "Inside Fueling Arrangement.pdf."

[260] WFA/Basin Opening electronic workpaper "Wilson Co e-mail.pdf."

[261] WFA/Basin Opening electronic workpaper "Fuel Storage Costs.xls."

[262] BNSF Reply electronic workpaper "III F 7 Facilities.xls," worksheet "Fueling -- Inside."

includes spill containment, sump, and parking area with area lighting. The sump will be periodically emptied by a vacuum truck.

The costs for these facilities are included in BNSF Reply electronic workpaper "III F 7 Facilities.xls," worksheet "Fueling -- Helper."

(c) <u>Maintenance Fluid Storage Costs</u>

As WFA/Basin provided no costs for maintenance fluid storage, Mr. Primm obtained budgetary price quotes from Brown-Minneapolis Tank Company, the company that manufactured and installed the storage tanks presently in use at BNSF's fueling facilities at Guernsey. The quote included costs for the following tanks:

- Diesel fuel storage tanks including one 1,000,000-gallon and two 100,000-gallon tanks
- Lubricating oil storage tank
- Air compressor oil storage tank
- Methanol storage tank
- Glycol storage tank
- Toilet chemical storage tank
- Waste oil storage tank
- Soap storage tank.

The prices for these tanks include material, field erection, and shipping costs. All of these tanks meet American Petroleum Institute (API), National Fire Protection Association (NFPA), and Environmental Protection Agency (EPA) regulations.

Mr. Primm also added costs for the ancillary equipment omitted from WFA/Basin's costs, such as delivery areas and equipment, drip pans, pumps, tanks, walkways, air compressors, pump houses, canopy, containment around storage tanks and secondary containment liners under facilities. The unit costs for these items were taken from RS Means or manufacturers' quotes, which are included in BNSF's workpapers.[263]

BNSF's restated total locomotive fueling facilities cost is $16.9 million.

c. Locomotive Maintenance Facility

WFA/Basin proposed to construct a 110,250 square foot shop enclosing five tracks. WFA/Basin state that the shop will perform 92-day and other inspections, general repairs and overhauls. The shop will also have a wheel truing machine for re-profiling wheels and a drop table for removing traction motor/wheelset combos from the locomotive.[264]

Mr. Primm accepts the need for a drop table, and a wheel truing machine, and the need to provide tracks to perform periodic maintenance and FRA mandated inspections. Based on the work areas designations, Mr. Primm assumes WFA/Basin's proposed overhauls will involve the removal, repair and replacement of major components (engine, turbocharger, main alternator, trucks, traction motors, fans, dynamic brake grids, air compressor, air brakes, traction rectifier/invertor assemblies, etc.) on the locomotive.

WFA/Basin designate an area of 3,750 square feet for a wheel shop and 6,250 square feet as a truck shop on the floor plan for their locomotive shop. They also designate 39,250 square feet of shop as generic work space (19,500 square feet shown as "Work Area" between Tracks "A" and "B," 16,250 square feet between Tracks "C" and "D," and 3,500 square feet next to the parts storage area). This implies that WFA/Basin intend to make wheel and truck repairs in the LRR's locomotive shop and that the LRR would perform repairs on other component parts of the locomotive. However, WFA/Basin failed to provide any of the major pieces of maintenance

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263 BNSF Reply electronic workpapers "Fueling Facilities.pdf;" "RS Means Square Foot Costs.pdf;" and "RS Means Building Construction Costs.pdf."

264 WFA/Basin Opening Nar. at III-F-94 to 95.

equipment necessary to disassemble, repair, and assemble the locomotive wheelsets; jigs and fixtures to repair truck frames; or any other equipment necessary to repair engines, engine subcomponents, traction motors, main alternators, dynamic brake grids, air compressors, air brake equipment, fans, or rectifier/invertor assemblies. Therefore, Mr. Primm assumes that WFA/Basin intended to overhaul all components of their locomotives at their locomotive maintenance shop except for traction motors, main alternators, companion alternators, and air brake equipment.

There are significant errors and omissions in the design and selection of maintenance equipment provided by WFA/Basin. The design for a well-laid out efficient locomotive shop includes providing bridge cranes over inspection and service tracks to allow defective locomotive components such as engine power assemblies, turbochargers, dynamic brake grids and cooling fans to be quickly removed and replaced. It also provides dispensing stations for various maintenance fluids so fouled fluids can be quickly drained and replaced. The design of inspection pits and platforms must allow free and easy access to all areas of the locomotive to facilitate the efficient inspection of the locomotive and replacement of defective parts. All of these necessary requirements have been incorporated in the AREMA "Design Criteria for Diesel Repair Facilities" and are the basis for a modern locomotive facility fully capable of efficiently maintaining modern locomotives.

(1) <u>WFA/Basin's Errors and Omissions</u>

(a) <u>Building Structure</u>

WFA/Basin state on Opening that the cost for their proposed locomotive shop has been calculated using a quote from Kessel Construction.[265] However, the "quote" is completely

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[265] WFA/Basin Opening electronic workpaper "Kessel Locomotive Shop.pdf."

devoid of any construction cost information, including the contract sum, which appears only in WFA/Basin's electronic spreadsheet. WFA/Basin's electronic spreadsheet, "Buildings and Sites.xls," worksheet "Locomotive Shop" shows a total cost of $2,907,795 or $26.37 per square foot.[266] This square foot construction cost was incorrectly[267] adjusted to 4th quarter 2004 by using an adjustment factor of 0.9977, resulting in an adjusted cost of $26.31 per square foot for all the equipment and materials included in the Kessel Construction proposal. WFA/Basin then added $4,339,418.89 in equipment costs ($39.36/sf) from the "Locomotive Shop Equip." sheet of WFA/Basin's spreadsheet to calculate a total adjusted cost for the locomotive shop building of $65.67 per square feet. WFA/Basin then used this total adjusted cost to calculate the total building cost on their electronic spreadsheet "Buildings and Sites.xls," worksheet "Total Building Cost."

The materials and equipment in the Kessel proposal include site preparation, foundations, concrete floor slabs, building superstructure (frame, roof, walls), overhead doors, interior partitions, ceiling, flooring, paint and finishes, heating, ventilating and air conditioning, electrical service, plumbing, fire protection, 35-ton capacity bridge cranes, and jib cranes.

In response to BNSF's request for workpapers providing the unit costs and quantities used by Kessel Construction, Inc. to prepare its estimate for construction of the locomotive shop, WFA/Basin responded that "All relevant workpapers were provided with WFA/Basin's opening evidence. See electronic workpaper files "Kessel Locomotive Shop.pdf," "Locomotive Shop

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[266] The amount of $2,907,795 is found nowhere in the supporting documents from Kessel, but is hard coded in the formula in cell D25 (2907795/110250) in WFA/Basin electronic workpaper "Buildings and Sites.xls," worksheet "Locomotive Shop."

[267] As discussed in section III.F.3, WFA/Basin incorrectly indexed its costs. The correct index factor should be 1.0023.

Floor Plan.pdf" and "Locomotive Shop Pits.pdf." Of the cited documents, only "Locomotive Shop Pits.pdf" had any cost information, and that was limited to costs for embedded track.

Moreover, the Kessel Construction specifications[268] for the locomotive shop suggest that the components upon which Kessel based its cost estimate are inadequate for the LRR shop. A few examples are given below.

Foundations. The foundations included in the Kessel specifications at page 8 consist of a 24" x 8" concrete footer and an 8" poured concrete wall. The column footings are significantly undersized and the wall too narrow for a building with an eave height of 36 feet. For comparison, the column footings at UP's Hermiston locomotive maintenance shop ranged from 24" x 36" x 24" deep to 36" x 48" x 24" deep for the maintenance shop, 30" x 30" x 18" deep for the warehouse, and 24" x 24" x 18" deep for the office. Foundation wall thickness is typically 10-inch thick in the maintenance shop and 8-inch thick in the warehouse and office areas.

Concrete floor slabs. Similarly, the concrete floor slabs in the shop area are 6-inch thick, *id.* at page 10, whereas BNSF and UP floor thicknesses are typically 10 inches in the shop areas, considerably more robust construction than that proposed by Kessel Construction and necessary to accommodate the live loads from material handling vehicles.

Heating and Ventilation System. The Johnson Air-Rotation heating system specified by Kessel Construction at page 20 of its quote is inadequate to heat the locomotive shop (1) because it assumes that the building will be sealed during the heating season, even though the railroad and other drive-through doors will be opened frequently to allow locomotives and material handling vehicles to enter and exit the shop, and (2) because it is inefficient (and unwise) to depend on one heating unit for the entire shop. If the unit fails, all shop work comes to a

[268] WFA/Basin Opening electronic workpaper "Kessel Locomotive Shop.pdf."

standstill. Locomotive shops of similar size, such as BNSF's Barstow, Corwith, Topeka and North Kansas shops, have distributed gas unit heaters around the shop so that if any one fails, only a small area of the shop is affected. For ventilation of the shop, Kessel Construction proposes three 12,000 cfm (cubic feet per minute of air flow) propeller fans.[269] This is clearly inadequate for a building in which locomotives will be running. By comparison, UP's Hermiston shop uses for each track: one 5,325 cfm, 24-inch propeller fan; and three 40,000 cfm, 60-inch power roof ventilators. For the warehouse area five 20,000 cfm propeller fans and three 8,200 cfm, 36-inch power roof ventilators are used.

Electrical and Plumbing. It also appears that the Kessel Construction quote includes only limited electrical and plumbing equipment.

Cranes. The most egregious inadequacies are with respect to the arrangement of cranes. The Kessel Construction document provides for either a 65-ton capacity bridge crane or a 35-ton capacity bridge crane with a hook height of 26 feet 3 inches. The SD-70MAC is 15 feet 8 inches tall from top of rail to top of the locomotive's cooling fan, so Kessel's hook height leaves only 10 feet 7 inches above the locomotive. That is precious little space to lift the hood off of the locomotive or the diesel engine or other large component over the locomotive when the heights of the chains, slings, or lifting fixtures are included. Mr. Primm recommends a minimum hook height of 28 feet.

There are several problems with the proposed jib crane arrangements. Jib cranes are generally not used as WFA/Basin propose because such arrangement is unworkable. First, WFA/Basin erred in the height of the jib cranes that they propose to use. The SD-70MAC locomotive is 15 feet-8 inches tall over its roof-mounted cooling fans. The SD-40-2 locomotive

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[269] WFA/Basin Opening electronic workpaper "Kessel Locomotive Shop.pdf," p. 21.

is 15 feet-7-1/4 inches. The hoist height that WFA/Basin selected for its jib crane is 14-feet, so the jib crane is incapable of lifting anything off of the top of the locomotive, which severely limits its use. Its hoist would hit the side of the locomotive instead. Including an allowance for the trolley and hoist, the crane would conservatively have to have at least 20 feet of lift to be of any use.

Second, the arrangement of jib cranes proposed by WFA/Basin appears unworkable because the crane booms are 13 feet long (Kessel p. 30). According to WFA/Basin's workpaper "Locomotive Shop Floor Plan.pdf," Tracks "D" and "E" are 30 feet apart. An SD-70MAC is approximately 10 feet-3 inches wide. Therefore, the end of the boom might just reach the side of the locomotive's hood, rendering it of little use for maintenance or repair activity. And since the booms swing in an arc, the boom would only be next to the locomotive's hood when it was perpendicular to the locomotive. As the SD-70MAC is 74 feet-0 inches long, a substantial length of the locomotive would be unreachable with the jib crane.

This is why the AREMA design criteria for locomotive maintenance facilities show bridge cranes being used over repair inspection tracks.[270] WFA/Basin's proposed design is an unworkable arrangement and demonstrates why railroads use 3-ton or 5-ton capacity bridge cranes instead of jib cranes over tracks used for periodic inspections, maintenance and repairs. WFA/Basin omit bridge cranes over Tracks "A" and "C." Track "A," which serves the wheel truing machine and drop table, should be provided with a 10-ton capacity bridge crane to allow traction motor/wheelsets (combos) to be placed on and removed from the drop table and moved to work stations for repair. The bridge crane would also be used to load and unload combos

[270] AREMA "Design Criteria for Diesel Repair Facilities" at 6-4-10 and 6-4-11, included as BNSF Reply electronic workpaper "Locomotive Maint Facility.pdf."

from transport trucks and to and from storage. A 15-ton capacity bridge crane should be provided over Track "C" to support WFA/Basin's locomotive overhaul activities.

Locomotive Shop Floor. The locomotive shop floors also are inappropriately designed. Locomotive shop floors, especially at tracks dedicated to running repairs and periodic maintenance functions, are multi-level, not flat as in the Kessel proposal. Locomotive shops have pits for wheel truing machines and drop tables. WFA/Basin attempt to compensate by adding costs for pit structures in their electronic spreadsheet "Buildings and Sites.xls," worksheet "Locomotive shop Equip." However, WFA/Basin's costs are understated because they erred in their pit depth assumptions and omitted reinforcement of the track structure under the embedded rails. For example, in their Opening Evidence at page III-F-95, WFA/Basin state that the drop table pit is 18 feet-5 inches deep, but as shown in WFA/Basin Workpaper "Truck Drop Table 2.pdf," that is only the depth of the A. T. Moeller drop table from top of rail to the top of the pit floor and does not include the thickness of the pit floor which would be approximately 18 inches thick. WFA/Basin similarly undersized the wheel truing machine pit as their dimension for the Simmons underfloor wheel lathe is inconsistent with construction drawings provided by Simmons Machine Tool Company for installation of one of its underfloor wheel lathes at UP's Hinkle Locomotive Shop. Therefore WFA/Basin understated the size and correspondingly the cost of the wheel truing machine table pit. Reinforcement of the track structure under the embedded track, which WFA/Basin omitted, typically includes a 2 feet-6 inch by 9 feet-0 inch thick slab to support the dead and live loads associated with locomotives moving through the shop.

WFA/Basin also failed to provide the floor levels necessary for safe access to the locomotive, and the Open Pit design on the track dedicated to locomotive overhauls actually leaves a 10.5-inch gap between the edge of the pit and the side of the locomotive, making it unsafe if not impossible for employees to reach the locomotive.

These are only some of the inadequacies in the specifications underlying the Kessel Construction quote for the locomotive shop. Because of these and other inadequacies and the lack of information on the quantities and unit costs underlying the Kessel Construction estimate, Mr. Primm based his restatement of costs on his conceptual design and costs from manufacturers or RS Means.

(b) Maintenance Tools

To develop locomotive maintenance equipment costs, WFA/Basin relied entirely on information from Omnitrax for a small shop designed to maintain just 14 locomotives for the Union Pacific Phoenix Project.[271] However, WFA/Basin omitted considerable quantities of tools necessary to maintain the much larger LRR fleet of high-utilization, high-mileage locomotives.

The following is a partial list of the maintenance tools and equipment that were omitted from WFA/Basin's locomotive shop costs on electronic spreadsheet, "Buildings and Sites.xls," worksheet "Locomotive shop Equip":

- Truck Turnover Fixture – required to invert trucks so that wheelsets can be removed and truck frame positioned for repair.
- Truck Repair Stand – required to support and tram truck during repair operations.
- Traction Motor Stands – required to support traction motor during installation or removal of wheelsets.
- Traction Motor Gear Case Rack – required to transport traction motor gear cases to parts washer to clean out gear lubricant.
- PROCECO Parts Washer – required to clean gear lubricant out of gear cases and clean other parts.

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[271] WFA/Basin Opening electronic workpaper "UP-Phoenix Maintenance Cost.pdf."

- Gear Gages – required to check wear of traction motor pinion and bull gears.

- Coupler Gages – required to check wear of couplers and yokes.

- Draft Gear Gages – required to check capacity of draft gear.

- Opacity Tester – required to check diesel engine exhaust.

- Load Box – required to provide electrical load to allow performance testing of locomotives such as the SD-40-2 not equipped with self-loading feature.

- Jacks and Jack Stands – required to lift locomotive off of its trucks and support underframe during overhaul. Jacks can be hydraulically- or electrically-powered.

- Engine Lifting Fixture – required to properly lift and move engine.

- Power Assembly Rack – required to store and protect power assemblies during transport.

- Slings, Straps, Chains – hardware required to lift parts with cranes.

- Repair Benches – required to support parts during inspection and repair.

- Air Brake Test Device – required to qualify operation of the locomotive's air brake system.

- Wheel Shop Equipment. The equipment listed below include, most but not all of the major pieces of equipment needed to disassemble, repair, and reassemble locomotive wheel sets:

    - Axle Roller Bearing Puller
    - Wheelset Washer
    - Axle Measuring Station
    - Mount/Demount Press
    - Magnaglo Inspection Machine (Magnetic Particle Testing)
    - Axle Lathe
    - Vertical Wheel Boring Mill
    - Axle Roller Bearing Press
    - Axle Racks
    - Wheel Storage Racks
    - Material Handling Conveyors

Mr. Primm has provided prices for several of the specialized maintenance tools based on current price quotations from tool and equipment manufacturers. Mr. Primm also provided estimated costs for shop-made repair component stands.[272]

(c) Wash House

On Opening, WFA/Basin provided a cost for a 3,000 square foot single-track wash house of $123,942.45.[273] WFA/Basin provided no backup information to support that cost. In response to a workpaper request, WFA/Basin stated that their cost was based on a verbal quote from Kessel Construction of $83,940.00. WFA/Basin's electronic workpaper "Buildings and Sites.xls," worksheet "Locomotive Shop" shows that WFA/Basin divided that amount by 3,000 to get a $27.98 per square foot unit cost. They then indexed the unit cost by .9977 and added $40,197.55 for equipment based on a formula for 48% of the construction cost. They then divided that number by 3,000 and added it to the $27.98 to derive a total construction unit cost per square foot of $41.31.

In *Otter Tail, AEPCO, AEP/Texas*, and this case, BNSF has proposed a two-track wash house to allow shop forces to thoroughly clean the interior and exterior of the locomotive, to provide a clean work environment for its mechanics, and to comply with FRA regulations concerning locomotive cleanliness. In each of these cases the structure provided an enclosed location to contain the spray from the washing operation. Concrete pads and trenches were provided to collect wash and rinse water and convey them to the industrial wastewater treatment plant. The washing process is completely manual and uses high-pressure detergent wash and water rinse (similar to a self-service car wash). Platforms with fall protection are provided to

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[272] BNSF Reply electronic workpaper "Locomotive Maint Facility.pdf."

[273] WFA/Basin electronic workpaper "Buildings and Sites.xls," worksheet "Total Building Cost."

allow the employees to wash the roof of the locomotive. Two tracks are provided in this facility because it takes about an hour to wash a locomotive in this manner and thus the second track is necessary to meet the demand. In Mr. Primm's experience, similar two-track wash houses in North Kansas City and Chicago efficiently handle fleets of approximately 100 locomotives and therefore are good models for the efficient handling of the LRR's proposed fleet of 134 locomotives, as restated by BNSF's operating witnesses.

This system is not to be confused with a single-track automated wash facility that uses acid to clean the exterior of the locomotive and an alkaline solution to neutralize the acid before the locomotive receives a clear water rinse. The cost for the wash equipment for this type of facility is \${ }[274] and includes acid and alkaline storage tanks, high-pressure pumps, motors, wash fluid dispensing arches with high-pressure nozzles. This does not include the cost of the building needed to house the spray arches or the pump room to accommodate the storage tanks, pumps, motors, and controls. An automated wash system of this type can easily wash 100 locomotives per day on one track. However, as WFA/Basin did not provide for an automated facility, Mr. Primm designed a two-track manual facility adequate to handle the LRR fleet.

(d) Site Development

WFA/Basin's electronic spreadsheet "Building Site Development Costs.xls" shows only gravel areas for parking. Due to the weight of locomotive components and materials, either asphalt or concrete driveways, parking areas, and material storage areas are customarily provided. Placing heavy equipment such as engine blocks, traction alternators, and traction motors on gravel surfaces will result in them sinking into the ground.

[274] BNSF Reply electronic workpaper "Locomotive Maint Facility.pdf."

(2) BNSF's Restatement

Mr. Primm designed the locomotive maintenance facility in accordance with the requirements for the size of the LRR locomotive fleet (136) as determined by BNSF operating witnesses and with their determination of the number of locomotives to be handled per day at the facility. He also sized the shop to accommodate WFA/Basin's requirements for performing locomotive overhauls. In order to correct the errors, omissions, and deficiencies of WFA/Basin's pricing of their locomotive shop, BNSF Engineering Consultant Primm prepared conceptual designs[275] meeting the appropriate AREMA design criteria and, where applicable, federal requirements for a wash house, locomotive emissions testing building, pump house and pipe racks. His restatement of costs for the locomotive shop include the following:

- Wash House
- Locomotive Emissions Test Building
- Pump House
- Pipe Racks
- Storage Tank Containment Structure.
- Shop Tracks (200 feet) for the inbound and outbound storage of locomotives, a 100-foot track for performance testing
- Concrete drip pans (100' long) on all inbound and (125' long) on all outbound shop tracks
- Concrete walkways at ends of shop to provide safe access to the locomotive for maintenance personnel
- Minimum 10' wide driveway at the inbound end of the shop and an apron at each end of the shop for materials management vehicles to enter and exit the shop
- Locomotive maintenance fluid distribution piping and dispensing stations in the shop
- Multi-level floor, pit, and platform arrangement for access to locomotives
- Fire-sprinklers on the building ceiling and under platforms
- 10-ton bridge crane over the drop table and wheel truing machine track
- 15-ton bridge crane over work areas adjacent to the "overhaul" track

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[275] BNSF Reply electronic workpaper "Locomotive Maint Facility.pdf."

- 3-ton bridge crane over inspection and running maintenance tracks
- 35-ton bridge crane over the "overhaul" track
- Craneway support structure and electrification for all bridge cranes
- Jib cranes at locations where locomotive components are inspected and repaired
- Blue flag, blue light, and derail protection on all lead tracks
- Concrete pad with security fencing for outside material storage
- Connections to the following utilities:
  1. Sanitary sewer
  2. Wastewater sewer
  3. Water
  4. Natural gas
  5. Electricity
- Electrical substation for shop.

Details of BNSF's restatement of locomotive shop costs are included in its electronic workpapers.[276]

d. Car Repair Shop

WFA/Basin stated in their Opening Narrative that their car maintenance contractor is responsible for providing all necessary shops.[277] WFA/Basin therefore did not provide a facility in which the contractors could perform the needed repairs. BNSF operating witness have accepted WFA/Basin's position that their railcar maintenance contractor is responsible for providing a car maintenance shop suitable to its needs. Therefore the cost of a LRR-provided railcar maintenance shop is not included in BNSF's restatement of the cost of LRR buildings.

e. Crew Change Facilities and Yard Offices

WFA/Basin provided 13,000 square foot buildings at Donkey Creek and Guernsey for crew changing facilities and MOW crews. BNSF operating and MOW witnesses, Mr. Mueller

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[276] BNSF Reply Electronic workpaper "III F 7 Facilities.xls," worksheet "Locomotive Shop."

[277] WFA/Basin Opening Nar. at III-F-97.

and Mr. Albin, agree that these facilities are sufficient to meet their restated crew sizes. Therefore, Mr. Primm has not made any changes to the sizes or locations of these facilities.

However, Mr. Primm does take issue with WFA/Basin's construction costs for their crew change facilities and yard offices because there is an error in the location factor calculation used to develop that cost. BNSF's Engineering Consultants accept WFA/Basin's use of the Historical Factor of 1.2256 and the use of the Location Factor for State College, PA (0.95) for Bradford, PA, and the Location Factor of Wheatland, WY (0.75) for Guernsey, WY, as shown on WFA/Basin's electronic workpaper "Crew and MOW Buildings.pdf." However, BNSF's Engineering Consultants disagree with the computation used to convert the construction cost of the building from Bradford, PA to Guernsey, WY.

The correct computation to convert the construction cost of the headquarters from Bradford to Guernsey is to multiply the Bradford cost by (0.75/0.95=0.7895). With this correction, the total adjusted cost per square foot for the crew change facilities and yard offices at Guernsey is $52.28. This corrected square-foot construction cost is used to calculate the cost of the crew change facilities and yard offices in BNSF's restatement.

Details of the costs are included in BNSF's workpapers.[278]

f. Maintenance-of-Way Buildings

In addition to the combination crew change and MOW buildings at Donkey and Guernsey, WFA/Basin provided 6,500 square-foot facilities for MOW crews at Reno, South Logan and Bridger Jct. BNSF witness Mr. Albin agrees that these facilities are sufficient to handle his restated MOW crews. Therefore, Mr. Primm did not make any adjustment to the size or location of these facilities.

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[278] BNSF Reply electronic workpaper "Roadway Buildings.pdf" and BNSF Reply Electronic workpaper "III F 7 Facilities.xls," worksheet "Crew Change and MOW."

Mr. Primm accepts WFA/Basin's basic construction cost for their MOW buildings. However, WFA/Basin erred in using the same square-foot construction costs for both 13,000 and 6,500 square foot buildings. As shown in WFA/Basin's electronic spreadsheet "Buildings and Sites.xls," worksheet "Crew & MOW," a price per square foot of $46.80 is used for all maintenance of way and crew change buildings. The price per square foot for the 6,500 square-foot building should have been increased to reflect the loss of discounts for smaller quantities of construction materials and allocation of contractor fixed costs over a smaller size building. It is common knowledge in the design and construction industry that the construction costs per square foot decrease as the building size increases. The RS Means Square Foot Cost guide for a repair garage submitted by WFA/Basin illustrates this point.[279] On the table of Costs per Square Foot of Floor Area, depending on exterior wall construction, the square-foot costs of the 6,000 square foot building are from 5.6 to 7.0 percent higher than the square foot costs of the 12,000 square foot building. Based on the differentials in the RS Means Guide, square foot construction costs used to calculate the construction costs for the 6,500 square foot building should be increased by 6.2 percent for a building with a concrete block exterior wall and steel joist construction.

In addition to the adjustment to the unit cost, BNSF has included the appropriate ventilation, tools and insulation. Details of BNSF's restatement of costs for LRR MOW buildings are included in BNSF's workpapers.[280]

g. Wastewater Treatment

WFA/Basin stated in their Opening evidence that they are providing one 30,000 gallon per day (gpd) wastewater treatment plant to serve all of the facilities at Guernsey. A 10,000 gpd

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[279] WFA/Basin Opening electronic workpaper "138.pdf."

[280] BNSF Reply electronic workpapers "Roadway Buildings.pdf" and "III F 7 Facilities.xls," worksheet "MOW –(Reno, etc)."

plant will serve the Donkey Creek crew and MOW facilities. WFA/Basin Opening Nar. at III-F-99. WFA/Basin's electronic spreadsheet "Waste Water Treatment Plants.xls" contains costs for the wastewater treatment plants. Mr. Primm objects to the costs developed for these plants because they do not fully account for all costs associated with pre-treatment of both industrial and sanitary wastes. WFA/Basin based their capacities on the number of employees at each location. While this type of allocation is appropriate for sizing wastewater treatment facilities that treat only sanitary waste, it makes absolutely no provision for sizing the facility to handle industrial wastewater streams from locomotive washing operations, general shop maintenance, and storm and wastewater collected from track pans outside the locomotive maintenance shop and at the locomotive fueling facilities. Ignoring these industrial waste streams allows WFA/Basin to greatly undersize their proposed wastewater treatment facility at Guernsey.

Furthermore, the treatment process on which WFA/Basin based their wastewater treatment costs is unsuitable for treating industrial waste streams containing emulsified suspensions of oil, detergent and water. The blown air aeration system is adequate for processing waste streams in which oils have already been removed, but will not break down emulsified oil/detergent/water solutions. For that, a dissolved air flotation (DAF) system is required. This system uses flocculants to break down the emulsified oil/detergent/water suspensions so that the oil can be removed.

It should also be noted that WFA/Basin only provided a gravity oil/water separator at the locomotive fueling facilities and made no provision for treating oily waste streams from the locomotive maintenance facilities. An oil-water separator is not sufficient to adequately pre-treat the effluent before it is discharged into a publicly-owned treatment works. The soap from normal housekeeping activities combined with petroleum-based products (spill or leakage from locomotives) creates emulsions that act to suspend the petroleum products, requiring additional pre-treatment through a DAF.

WFA/Basin provided a cost for the oil/water separator, bar screen, equalization tank, control panel and pump station,[281] but did not provide support documentation for either the technical specifications or the cost of the mechanical facilities.

Mr. Primm therefore has redesigned a wastewater treatment plant to incorporate a DAF and its associated pumps and piping to properly pre-treat effluent from the mechanical maintenance and locomotive fueling facilities. The facility will include an oil/water separator, metering station, industrial wastewater treatment, industrial and sanitary collection sumps and pumps, and discharge structure to a POTW. The model for the wastewater treatment plant is the design provided for UP's Hermiston Locomotive Maintenance and Fueling Facility.[282]

WFA/Basin stated that they will provide a 400 gallon per day (gpd) waste water treatment facility for each of the small MOW and crew change facilities.[283] BNSF accepts the use of a septic system and leach field only at locations where connections to a POTW are unavailable. At other locations the sanitary sewer must be tied into sewer lines to the POTW.

Mr. Primm also corrected an error in WFA/Basin's fence cost for the WWTP. The cost for the 20-foot wide gate used in WFA/Basin's "Waste Water Treatment Plants.xls" should be $1,450 (WFA/Basin electronic workpaper "028-2.pdf") not $1,425.

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[281] WFA/Basin Opening electronic workpaper "Waste Water Treatment Plants.xls," worksheet "30,000 Gal WWTP Cost."

[282] BNSF Reply electronic workpaper "WWTP.pdf."

[283] WFA/Basin Opening Nar. at III-F-99.

Details of BNSF's restatement of costs for waste water treatment plants are included in its workpapers.[284]

h. Yard Air and Yard Lighting

WFA/Basin's costs for site lighting are inadequate because the arrangement shown on its electronic spreadsheet "Building Site Development Costs.xls," worksheet "Yard Lights Drainage Roads" provides insufficient illumination levels. As shown on WFA/Basin's workpaper "Lights1.pdf," WFA/Basin used the "Vector" series lamp as manufactured by Holophane, which is designed for lighting divided highways, not train yards or parking lots. The lamp in this configuration provides an average of 0.98 foot-candles (fc) with a maximum of 2.37 fc and a minimum of 0.27 fc and maximum to minimum uniformity of 8.87 to 1. This means that the light's intensity distribution has a great deal of fall-off from its center to its edges. This effect can be observed in highway driving where there is a large area of relative darkness between adjacent light poles.

This is not a suitable lighting arrangement in a train yard where car inspectors must have sufficient light to observe the condition of locomotives and railcars during their train inspections. The average foot candle illumination level produced by WFA/Basin's proposed arrangement is only 20 percent of that normally provided in the parking lots of shopping malls (5 fc with a uniformity of 1.8 to 1). In order to provide an adequate lighting level for train inspection, BNSF Engineering Consultants have used WFA/Basin's light fixture and pole arrangement, but decreased the spacing of the poles from 310 feet to 100 feet in order to raise the illumination level to approximately 20 foot-candles and increase the uniformity of the lighting coverage to approximately 1.6 to 1.

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[284] BNSF Reply Electronic workpaper "III F 7 Facilities.xls," worksheet "WWTP."

In electronic workpaper "Yard Lights.xls," WFA/Basin used a cost of $3,436.76 for a yard light with two 400-watt high-pressure sodium fixtures, one bracket arm, and one 40' tall aluminum pole. It appears that costs for one of the two lighting fixtures per pole have been omitted from the lighting costs. WFA/Basin Opening workpaper "390.pdf" shows the cost for a 400-watt high-pressure sodium fixture as $590.00. Based on costs in WFA/Basin's electronic workpaper, "391.pdf," Mr. Primm recalculated the costs for lights using both the galvanized steel light pole and an aluminum pole. As can be seen, the costs for both are significantly higher than WFA/Basin's cost of $3,436.76.

	Aluminum	Galvanized Steel
Foundation – (1)	$ 604.45	$ 604.45
Lights – (2) x $590.00 =	$1,180.00	$1,180.00
Bracket Arm – (1)	$ 158.00	$ 209.00
Pole - (1)	$2,475.00	$2,225.00
TOTAL	$4,417.45	$4,218.45
Historical Adj	x 0.9498	x 0.9498
ADJ. TOTAL	$4,195.69	$4,006.68

Therefore, Mr. Primm added the cost of the missing 400-watt high pressure sodium fixture not included in WFA/basin's yard lighting cost. He also replaced WFA/Basin's unsupported unit cost of $14.72 for wiring and conduit costs with RS Means prices for #10 AWG conductor and 2-inch rigid galvanized steel conduit in trench to calculate a cost of $22.30 per linear foot for lighting conductor and conduit. WFA/Basin also failed to provide any bollards to protect the light poles from vehicle impacts.

Because of the inconsistencies in WFA/Basin's evidence on lighting costs, BNSF has completely modified the costs, as documented in its electronic workpapers.[285]

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[285] BNSF Reply Electronic workpaper "III F 7 Facilities.xls," worksheet "Site."

i. Site Development Costs

In their electronic workpaper "Buildings and Sites.xls," worksheet "Total Building Costs," WFA/Basin include $14.7 million for site construction (grading) for the Guernsey, Donkey Creek and South Logan Yards. BNSF has included those costs in its grading costs.

j. Summary

BNSF's total restated costs for the buildings and facilities (excluding yard site development costs) is $51.6 million, as shown in Table III.F.7-1 at the beginning of Section III.F.7.

8. Public Improvements

a. Fences

(1) Right of Way Fencing

WFA/Basin included fencing for 90 percent of the Campbell Subdivision and 103 percent of the Orin Subdivision in accordance with the *TMPA* decision, and 100 percent of the remaining right of way. WFA/Basin stated on page III-F-100 of their Opening Narrative that their fencing quantity includes "coverage for the Campbell Subdivision at 90 percent of the route length and the Orin Subdivision at 103 percent (3 percent representing snow fence) of the route length in accordance with past STB decisions." Although BNSF agrees with the percentages, WFA/Basin have misstated the STB decision. In *TMPA,* both parties agreed that 90 percent of the Campbell Subdivision right of way would be fenced and that snow fences would be needed on 20 percent of the Orin Line.[286] The STB decided that 103 percent of the Orin Line would need right-of-way fencing. This accounts for the wing fences and cattle lanes that BNSF was obligated to build for adjacent landowners, not snow fence. As shown in BNSF Reply electronic workpaper "III F 8

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[286] BNSF Reply electronic workpaper "Fence.pdf."

Fencing.xls," the 103 percent can be replicated using the Masters documents upon which WFA/Basin rely for other Orin Line quantities.

WFA/Basin also failed to build fences on the entire right of way because they did not include fencing on the railroad owned mine spurs. BNSF has added these route miles to the fencing quantities.

WFA/Basin used a unit cost of ${ } per LF of fence that supposedly includes braces and corner panels. The linked file for that cost is the first page of the bid tabs for the Shawnee to Walker project which does not have any fencing costs in it. The second page of the document does have costs for fence, end panels, brace panels, corner panels and gates, as well as for fence removal. However, WFA/Basin's per linear foot cost could not be replicated using the available data from the Shawnee to Walker project. Therefore, BNSF Engineering Consultants have restated the fence unit cost using the Shawnee to Walker successful bidder's bid costs. The bid costs for fence, end panels, brace panels, corner panels and gates were summed and the total divided by the total feet of fence for the project to derive a unit cost of ${ } per LF.

(2) Snow Fence

WFA/Basin included snow fence on only three percent of the Orin Line, based on their misinterpretation of *TMPA*. As discussed above, the parties in *TMPA* agreed to include snow fences on 20 percent of the Orin Line, not three percent. In their restatement of fencing costs, BNSF Engineering Consultants have used information from an earlier inspection trip where they took note of the actual quantity of snow fence on the Orin Line.[287] For the remaining portion of the LRR route, ICC Engineering Report quantities were proportionally attributed to the LRR.

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[287] BNSF Reply electronic workpaper "Fence.pdf."

WFA/Basin used a unit cost from RS Means for a 4-foot metal post snow fence. This cost does not reflect the type of snow fence that is required in Wyoming. AREMA § 6.8.2.6.3[288] provides a standard for the "Wyoming Type" snow fence that is consistent with the type costed in the Wyoming DOT bid tabs, and with the pictures of snow fence taken on the Orin line. Therefore, BNSF Engineering Consultants used a unit cost of $12.79/LF taken from WYDOT's Average Unit Bid Prices for 2004 for 10-inch Wood Snow Fence. The AREMA standards and specifications for snow fencing, and pictures of the snow fence on the Orin Line are included in BNSF's workpapers.[289]

BNSF's calculations for fencing costs are included in its electronic workpapers.[290]

b. Roadway Signs

(1) Types and Quantities

In their Opening evidence, WFA/Basin included 631 roadway signs, consisting exclusively of milepost and whistle post signs.[291] BNSF agrees with the use and placement of these types of signs. Milepost signs inform the engineer where he is on the line at all times. Whistle posts are required at public crossings to provide advance warning to the public.

However, WFA/Basin omitted entirely all speed restriction signs, yard limit signs, advance warning signs and crossing signs, claiming that they were unnecessary as they can be accounted for in the timetables. WFA/Basin Opening Nar. at III-F-101. This is incorrect. FRA

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[288] AREMA § 6.8.2.6.3 provided as BNSF Reply electronic workpaper "Fence.pdf."

[289] BNSF Reply electronic workpaper "Fence.pdf."

[290] BNSF Reply electronic workpaper "III F 8 Fencing.xls."

[291] WFA/Basin electronic workpaper "III - F TOTAL.xls," worksheet "TOTALS."

regulation 218.35 specifically mandates the use of Yard Limit signs *in addition to the notification in the timetable.* It says

> After August 1, 1977, yard limits must be designated by –
>
> (1) Yard limit signs, and
>
> (2) Timetable, train orders, or special instructions.[292]

The General Code of Operating Rules that has been adopted by all western Class 1 and 83 short line railroads requires the placement of advance warning signs, speed signs and resume speed signs. No exceptions are made for having the information in the timetables.[293]

WFA/Basin cited the NORAC Operating Rules adopted by eastern railroads for the proposition that the signs are not required if the information is in the timetables. WFA/Basin Opening Nar. at III-F-101. The NORAC Rules provide that an employee coming on duty must familiarize himself with General Orders, Bulletin Orders and division notices. These provisions have nothing to do with the requirement for signs. In fact, the Eighth Edition of the NORAC Operating Rules, published in 2003, specifically require the use of all of these signs.[294] In any event the NORAC rules are applicable only to the eastern railroads that have adopted them and certainly do not supercede the General Code adopted by the western carriers. The point of adopting general operating rules is to have railroads within the same territories operate under similar rules. Since the LRR will be operating in the West, it is only reasonable that it would adopt the rules by which other railroads in that territory operate.

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[292] 49 CFR § 218.35, provided in BNSF Reply electronic workpaper "Signs.pdf."

[293] General Code of Operating Rules, Third Edition, effective April 10, 1994. Copies of the pertinent pages of the Code are included in BNSF Reply electronic workpaper "Signs.pdf."

[294] NORAC Operating Rules Sections 93, 278, 296 and 297, included in BNSF Reply electronic workpaper "Signs.pdf."

Station and yard limit signs, in addition to the mileposts, inform the engineer where he is on the LRR. Advance warning, speed restriction and resume speed signs put locomotive engineers on notice that they are about to enter or leave a restricted speed zone so that they can maintain a safe and efficient train speed and adjust the speed appropriately to pull into sidings, yards or mines. BNSF, therefore, has included all of these signs in its restatement of sign costs.

Flanger signs are used in heavy snowfall areas, such as the territory through which the LRR will move. These signs warn snowplow operators to raise the plow to avoid damaging the rails at turnouts, inner guard rails on bridges, crossing planks, failed equipment detectors and rail lubricators. WFA/Basin did not include any flanger signs on the LRR.

WFA/Basin stated in their Opening Evidence that they had included "a standard package of railroad signs" and yet included only mile post and whistle post signs, even though the quote for the "sign package" from Sperling includes prices for advance warning signs and flanger signs as well "all built to Conrail specs."[295] This suggests that Conrail uses these signs despite adopting the NORAC rules. In fact, no Class I railroad – other than a hypothetical Class I railroad – would eliminate these signs.

BNSF Engineering Consultants included speed restriction and resume speed signs and placed advanced warning signs in advance of the corresponding speed signs. They placed flanger signs at turnouts, crossing panels, failed equipment detectors and rail lubricators.

In addition to the above, BNSF Engineering Consultants recommended other signs that are used on railroads for safety and regulatory reasons. These include the following:

<u>Danger – Keep Off Bridge</u>: At each bridge location four warning signs should be used to keep trespassers and others away from the structure. Even with walkways there is limited

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[295] WFA/Basin Opening electronic workpaper "Signs.pdf."

clearance for walking when there is a moving train. These sign costs are included in the bridge costs.

FRA required 1-800 signs at crossings: The FRA requires that each grade crossing have a posted identification number and contact telephone number to call in case of an emergency. Each crossing would have a minimum of two signs that could be mounted either on active protection equipment or on a separate post. The costs for these signs have been added.

(2) Quantities

WFA/Basin hard coded milepost quantities in their "III - F TOTAL.xls" spreadsheet and provided no backup for the numbers used. BNSF Engineering Consultants, therefore, separately calculated the quantity of signs. Backup for their quantities is included in BNSF Reply electronic workpaper "III F LRR Construction.xls," worksheet "Sign Quantities."

(3) Unit Costs

WFA/Basin used a quote from Sperling for the materials cost for signs and added installation costs from 2005 RS Means. However, they neglected to add the overhead and profit to the RS Means cost. BNSF Engineering Consultants corrected that error in their restatement. WFA/Basin used the complete sign post unit cost from RS Means, which is acceptable.

For the yard limit and FRA crossing signs that BNSF Engineering Consultants added, they have used the Sperling quote for advanced warning signs.

Table III.F.8-1 demonstrates the difference in the parties' quantities of roadway signs. BNSF's total restated cost for roadway signs on the LRR is $141,110.

Table III.F.8-1
Comparison of BNSF and WFA/Basin
Quantities of Roadway Signs

Sign Type	BNSF	WFA/Basin	Difference
Milepost	377	235	142
Whistle Post	408	396	12
Flanger, Station	735	0	735
Advanced Warning/ Crossing /Yard Limit	287	0	287
Total Signs	**1,807**	**631**	**1,176**
Sign Posts	1,807	631	1,176

Source: WFA/Basin Opening electronic workpaper "III - F TOTAL.xls"; BNSF Reply electronic workpaper "III F LRR Construction.xls," worksheet "Total Cost."

c. Crossings

(1) At-Grade Crossings

WFA/Basin stated in their Opening Narrative that they built all at-grade crossings for public and private roads on the LRR and included 100 percent of the costs. WFA/Basin Opening Nar. at III-F-102. However, WFA/Basin neglected to include the crossings on the Black Hills and Valley Subdivisions that were clearly included in the BNSF crossing inventory provided to them in discovery. Three of the four omitted crossings are at-grade and the fourth is a railroad crossing over a private road. The railroad over the private road is on the Valley Subdivision and WFA/Basin did construct that as a railroad bridge, which they included in their bridge inventory. BNSF Engineering Consultants accept that change. In their restatement of crossing costs, BNSF Engineering Consultants have included the three omitted at-grade crossings.

In addition, for 25 of the crossings that WFA/Basin did build, they erred in the number of tracks for the crossing. BNSF Engineering Consultants have corrected these errors, and have highlighted those crossings in pink in the file "III F LRR Construction.xls," worksheet "At-Grade Crossings."

WFA/Basin's unit cost for at-grade crossings is based on an estimate from Duferco Farrell Corporation that simply states "Rebuild crossing LF 304 $210 per foot."[296] WFA/Basin on Opening claimed that this quote was for rubber/asphalt crossings, although no further backup was included in the Opening Evidence. In response to a workpaper request, WFA/Basin provided more specific information from Duferco Farrell concerning the crossings.

BNSF Engineering Consultants do not agree with the use of rubber/asphalt crossings on a high density, heavy axle loading line such as that being replicated by the LRR. WFA/Basin included a CSX construction standard in their track workpapers,[297] but did not discuss this standard relative to the LRR. If this were indeed intended to be support for their use of the rubber/asphalt crossing, it is not persuasive. WFA/Basin did not demonstrate when and where CSX uses that standard or whether that standard would be acceptable for the heavy axle loading traffic levels projected for the LRR. There is no evidence that CSX lines where such crossings are used experience the heavy axle loads that the LRR will experience on the PRB lines being replicated. Since the LRR will be carrying loads similar to those carried by BNSF on lines BNSF currently uses, the standards for those lines on the LRR should be those which BNSF has found to be the most efficient for those lines. There is nothing "efficient" about building rubber/asphalt crossings when a superior product for these lines -- concrete crossings -- is now available. BNSF's standard is to use concrete crossings, first because for heavy axle loading traffic they withstand the impact better and second because they can be removed during

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[296] WFA/Basin electronic workpaper "Crossings.pdf."

[297] WFA/Basin Opening Workpaper Vol. 10, p. 05890.

maintenance[298] and put back in place afterward, whereas the rubber/asphalt crossings must be torn up and replaced with new asphalt every time maintenance crews work on the crossing. Therefore, BNSF Engineering Consultants have installed concrete crossings on the LRR.

BNSF Engineering Consultants have used a unit cost of ${ }per linear foot for material and installation of a concrete panel crossing taken from the Shawnee to Walker AFE A040738.[299] This cost does not include transition ties, geotextiles, rail or OTM. Therefore, BNSF Engineering Consultants have added the additional geotextiles (discussed in Section III.F.3.a) and transition ties (discussed in Section III.F.3.c) for the at-grade crossings.[300]

(2) Warning Devices

For crossing warning devices, WFA/Basin include costs for cross bucks for all crossings on the LRR. However, in addition to double counting the cross buck signs, WFA/Basin erroneously installed them on crossings where the railroad goes over or under the road. Their total count of cross buck signs in their electronic workpaper "Road Crossing Worksheet.xls" is 272, which the embedded formula shows is two times the number taken from the inventory, but the quantity entered into their "III - F TOTAL.xls" spreadsheet is 544. BNSF's quantity of cross buck signs on restatement is 206.

WFA/Basin relied on a quote from Power Points Sign Company for their unit cost for cross bucks. BNSF Engineering Consultants accept that unit cost.

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[298] Maintenance such as surfacing or ballast cleaning requires removal of the ballast underneath the ties, which would require the crossing to be removed.

[299] BNSF Reply electronic workpaper "Road Crossing Costs.pdf."

[300] BNSF Reply electronic workpaper "III F LRR Construction.xls," worksheet "Total Cost."

WFA/Basin also developed unit costs for gates and flashers based on a quote from Safetran and applied that cost to 11 signalized crossings. The costs for the active warning devices are included in WFA/Basin's signal costs. BNSF reduced the number of crossings with protection from 11 to 9 because WFA/Basin erred on the occurrences of electronic crossing protection. [301]

(3) Overpasses

WFA/Basin state in their Opening Narrative that they had included 100 percent of the costs for all of the grade separated crossings north of Bridger Jct. and for 10 percent of the costs for those south of Bridger Jct., except for the bridge in the Guernsey State Park and the highway bridge over the Guernsey Yard where WFA/Basin included the full cost. WFA/Basin Opening Nar. at III-102.

BNSF Engineering Consultants determined that there are 20 overpasses on the existing BNSF lines being replicated by the LRR. WFA/Basin included 100 percent of the cost for eighteen and 10 percent for the other two overpasses. The locations and costs are shown in BNSF's Reply electronic workpaper "III F 5 Overpasses.xls." WFA/Basin's rationale is that the newer rail segments (Orin, Reno, and Campbell Subdivisions) were constructed after the original line was built and thus at a time when the roads were already in existence; therefore the railroad (as the junior entity) would have been responsible for the full cost of the overpasses. They applied that same assumption to other overpasses for which the senior entity was uncertain. For the two overpasses that were constructed after the railroad line over which they passed was in existence, WFA/Basin assumed that the railroad would be responsible for only 10 percent of the cost.

[301] BNSF Reply electronic workpaper "III F 6 CTC.xls," worksheet "Locations & Counts."

WFA/Basin stated in their Opening Narrative that for overpasses "[t]he unit costs were derived from an actual highway bridge construction project in Ohio." WFA/Basin Opening Nar. at III-F-77. However, WFA/Basin's evidence on their overpass unit cost consists solely of a notation of a telephone response to an undisclosed request. The note says "OHIO DOT uses $95-$105/SF for Vehicular Bridges."[302] No additional information is provided with respect to the design or specifications for construction of the overpasses, the types of materials used, whether the cost includes just the bridge or slope paving, road construction, or whether it includes materials or only labor and equipment.

WFA/Basin make an assumption that for one track the center span would be 50 feet, the abutment spans 25 feet, and where additional tracks are required, they added 25 feet per track. The abutment spans are assumed to have a slope of 1:1. The overpass width is assumed to be 36 feet (two 12-foot lanes with two 6-inch shoulders).

BNSF Engineering Consultants agree with the locations of the overpasses and the percentage of costs attributable to the LRR. They also agree with WFA/Basin's assumed overpass widths. BNSF Engineering Consultants do not agree with the assumed overpass length or with the unit cost for constructing overpasses, as discussed more fully in the subsections below.

(a) Length of Overpass

WFA/Basin's bridge assumptions for the overpasses are inadequate for the LRR. First, the slope assumed for the abutment back slope is under-designed at 1:1. The original Orin plans show that BNSF built the back slopes at 2:1, therefore requiring an increase in WFA/Basin's bridge length.

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302 WFA/Basin electronic workpaper "Ohio DOT.pdf"

Second, WFA/Basin assumed that all highway overpasses are perpendicular to the railroad, whereas available plans show otherwise.[303] Overpasses constructed at an angle to the railroad require increased bridge lengths.

To determine more appropriate overpass lengths, BNSF Engineering Consultants used the actual length data available for five of the existing overpasses defined in the original Orin Subdivision plans from Cordero to Bill.[304] A review of the plans shows that the original overpasses were designed to accommodate two tracks, which is consistent with the number of tracks WFA/Basin propose at these locations. The table below sets out the data for these five bridges.

Table III.F.8-2
Data Available in the Orin Documents for Overpasses
On the Orin Line

Orin Milepost	No. of Tracks	Length (Ft)	Road	In BNSF Orin Contract?	Skewed?	Length for One Track
29.930	2	200	Lawyer Road	No	No	175
42.950	2	194	Hwy 450	No	No	169
48.970	2	200	Co Road #38	Yes	No	175
69.400	2	190	Steckley Road	Yes	No	165
77.540	2	274	Hwy #59	No	Yes	239

BNSF Engineering Consultants used these data to develop lengths for overpasses for which actual data are not available. The first four bridges presented in the table are very similar in length and occur in locations where the bridge roadway is perpendicular to the railroad. The fifth bridge, Highway 59, is at a 45-degree skew to BNSF. BNSF assumed that bridges other than Highway 59 were perpendicular. For perpendicular overpasses, BNSF Engineering

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[303] BNSF Reply electronic workpaper "Overpasses.pdf."

[304] BNSF Reply electronic workpapers "Cordero to Reno Plans.pdf" and "Reno to Bill Plans.pdf."

Consultants used the average length of the four bridges or 196 feet. For the Highway 59 bridge, the used a length of 274 feet.

BNSF Engineering Consultants agree with WFA/Basin's use of an average width of 36 feet as that is consistent with the data for the five bridges. The roadway widths for the five bridges above range from 28 to 40 feet. When the additional width for the barriers is added, approximately 3 feet, the average width is approximately 36 feet.

(b) Unit Cost

WFA/Basin's vague telephone memorandum provides no information as to the costs covered by the \$95 to \$105/SF cost provided by the Ohio DOT. There is a notation in the subject line that says "Bridge Replacement," which suggests that the unit cost includes only the superstructure and substructure and not any other items, such as slope paving, approach grading, and paving. BNSF witness Ms. Gouger contacted the Wyoming DOT to determine whether the unit cost that WFA/Basin used is appropriate. Ken Spear, Contract Estimating Engineer at WY DOT, stated that they use a unit cost of \$120 to \$125/SF in estimating roadway bridges over railroads, and confirmed that this cost includes only the structure.[305]

Based on their evidence, it appears that WFA/Basin assumed that there are only structure costs associated with overpasses, but that is incorrect. As the original Orin Subdivision plans note, some overpasses were constructed by the railroad's Orin project contractor, and others were not. Those which were not were designated as "Not in Contract" or "By Others." The practice at the time was for the construction of state highway overpasses to be constructed by others under other contracts, separate from the railroad construction contract. Those contract costs would include more than just the bridge structure cost. They also would have included

[305] BNSF Reply electronic workpaper "Overpasses.pdf."

costs for such items as roadway grading, asphalt and fences, all of which were over and above the structure cost and should be included in the restatement of the LRR costs.

In order to determine how much additional cost should be included in their restatement of overpass costs, BNSF Engineering Consultants developed three unit costs: (1) a unit cost for the structure alone; (2) a unit cost to cover items such as road surfacing, pavement markings, delineators and traffic control that should be accounted for in the total costs; and (3) a unit cost for additional roadway items such as grading, asphalt, fencing, seeding and topsoil.

BNSF Engineering Consultants used the project bid tabulation for a 1999 overpass project constructed in Colorado (and available on the Colorado DOT website)[306] to develop three different square foot unit costs. The first unit cost that BNSF developed was for the structure only, which BNSF Engineering Consultants compared with the unit costs from the Ohio and Wyoming DOTs. The table below demonstrates that the Colorado project unit cost for structure *only* is very similar to the per square foot unit costs from the other two sources.

Table III.F.8-3
Comparison of Colorado Structure Cost
With Ohio DOT and Wyoming DOT Quotes

Source	**Square Foot Costs**
WFA/Basin Opening – Ohio DOT	$118.81
BNSF – Wyoming DOT	$120.00
Project Bid Tab	$120.23

The first square foot unit cost of $120.23 for the structure is applicable to all overpasses on the LRR.

The second unit cost that BNSF developed includes the structure plus items such as road surfacing, pavement markings, delineators and traffic control. These additional costs also should

[306] BNSF Reply electronic workpaper "Overpasses.pdf."

be accounted for in developing the total cost for all overpasses. Using the Colorado bid tabs for these items, BNSF developed a unit cost of $176.43 per square foot, as shown in BNSF's Reply electronic workpaper "III F 8 Overpasses.xls," worksheet "Built Up Overpass Cost." This cost includes both the structure and the additional costs described in this paragraph.

The third unit cost that BNSF Engineering Consultants developed includes additional costs for roadway items, such as grading, asphalt, fencing, seeding and topsoil that should be included in the costs for those overpasses that were not constructed as part of the original Orin Subdivision. For overpasses that were included in the original Orin construction, these items are included in the earthwork quantities for the Orin Line and thus are already included in the LRR costs. However, for overpasses constructed by others, these additional costs must be captured and added to the costs. Using the Colorado project, BNSF developed a unit cost of $273.30 per square foot to capture all costs associated with the construction of overpasses.

Of the five overpasses on the Orin Subdivision for which information was available, three were not a part of the Orin Line contract. These include the overpasses at Highway 59, Highway 450 and Lawyer Road. BNSF Engineering Consultants applied the $273.30 per square foot unit cost to the construction of these three overpasses.

For the two remaining overpasses on the Orin Subdivision and the 15 overpasses on the other segments of the LRR for which no information is available, BNSF Engineering Consultants assume that the earthwork costs are already captured and thus apply the $176.30 per square foot unit cost to avoid any double counting of costs.

The table below compares BNSF's restated crossings costs, including overpasses, with WFA/Basin's Opening estimates.

Table III.F.8-4
Comparison Of BNSF's Estimate Of Cost Of Crossing To WFA/Basin's Estimate In Opening Evidence (Millions)

Crossings Materials At Grade Crossing	BNSF	WFA/Basin	Difference
Crossings			
Asphalt/Rubber	0	$1.722	($1.722)
Concrete	$2.438	$0	$2.438
Warning Devices			
Signs and Crossbucks	$0.162	$0.108	$0.054
Overpasses	$24.539	$9.438	$15.100
TOTAL	**$27.138**	**$11.269**	**$15.870**

Source: BNSF Reply electronic workpaper "III F 8 Grade Crossings.xls," and "III F LRR Construction.xls;" WFA/Basin Opening electronic workpaper "III - F TOTAL.xls."

9. Mobilization

Mobilization plays a significant role in a project that involves the construction of both roadbed and structures for a new railroad. It takes a tremendous effort to coordinate and transport personnel, equipment, materials and supplies to the project sites and to establish temporary offices and other support facilities needed at the various construction sites both before and during the project. A similar effort is also required to dismantle the temporary facilities and return heavy construction equipment to the contractors' storage areas.

WFA/Basin applied the 3.5 percent mobilization factor accepted by the STB in *Xcel*[307] to all components except track labor, subballast installation, and the Headquarters building. Their rationale for excluding those items was that mobilization was included in the contractors' construction bid for those items.

Although for purposes of this case, WFA/Basin accept the 3.5 percent established by precedent, they continue to argue that mobilization should be significantly less than 3.5 percent

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[307] *Xcel*, slip op. at 117.

and that performance bonds and demobilization costs are unnecessary. WFA/Basin Opening Nar. at III-F-102 to 104. The STB has addressed and rejected all of those arguments in the past. Because it is now well settled that mobilization, demobilization and performance bonds are legitimate costs that should be included, BNSF will not address those arguments any further. BNSF Engineering Consultants likewise applied a 3.5 percent factor for mobilization to their restated costs, excluding items for which contractor costs already included mobilization.

10. Engineering

Consistent with the Board's decision in *Xcel,*[308] WFA/Basin included an engineering additive of ten percent of all construction costs, excluding land acquisition and mobilization. WFA/Basin Opening Nar. at III-F-104. Nonetheless, as with mobilization, WFA/Basin argued that the additive should be lower. In an attempt to bolster that argument, WFA/Basin claimed that BNSF incurred only an { } percent engineering fee on the Shawnee to Walker project. *Id.* at 105; WFA Opening electronic workpapers "BNSF/LR 22429.pdf" and "BNSF/LR 22430.pdf." The document that WFA/Basin cited, however, is an estimate for a 2004 *revision* to the original project, as noted in the Engineering line item. The project engineering was done significantly earlier in 2000. The actual engineering costs for the project were ${ },[309] which is { } percent of the total project cost.[310] Rather than supporting a lesser engineering additive, WFA/Basin's evidence shows the ongoing importance of engineering to a project, and why an estimate of costs for the construction of a railroad should include sufficient funds for engineering throughout the entire project.

[308] *Id.* at 118.

[309] BNSF Reply electronic workpaper "III F 10 Original Shawnee to Walker A000141.xls."

[310] BNSF Reply electronic workpaper "III F 10 Engineering.xls."

BNSF Engineering Consultants believe that an engineering additive considerably greater than ten percent can be justified for a large railroad construction project , but nonetheless use the ten percent used by WFA/Basin and accepted by the Board in *Xcel.*

11. <u>Contingencies</u>

In their Opening Narrative, WFA/Basin stated that "[c]onsistent with prior Board decisions in SAC rate cases, WFA/Basin's engineering experts have used a 10 percent contingency factor and applied it to the construction subtotal excluding land." WFA/Basin Opening Nar. at III-F-105. This is *not* consistent with prior Board decisions, because WFA/Basin excluded not only land, but mobilization and engineering as well. The Board's contingency factor in the cases cited was applied to the total cost less land.

WFA/Basin argued that a lower contingency factor would be appropriate and cited a lower contingency factor on a BNSF AFE. Mr. Boileau points out that by the time BNSF prepares an AFE, the project is well advanced in the design and costing process. BNSF's truly preliminary estimates include 20 percent contingency, but drop down significantly as the project becomes more defined. WFA/Basin's second piece of "evidence"of a lower contingency factor is their use of the 2004 Revision of the Shawnee to Walker project, which contained what WFA/Basin characterized as a "preliminary contingency factor" of { } Far from being preliminary, that factor was applied to a revision of a project that was already underway.

In the experience of BNSF engineering witnesses, contingency factors in excess of ten (10%) percent are not uncommon at the *final* design level of a project of this magnitude, and are substantially higher during the initial planning stages. As planning and design work progress, the project cost estimates become more site specific and precise, and contingencies are reduced accordingly.

BNSF Engineering Consultants have used the Board's ten percent factor in this case, but consistent with Board precedent, they have applied it to the total construction costs, including mobilization and engineering, and excluding only land acquisition costs.

12. Other

a. Construction Schedule

WFA/Basin propose an ambitious 26-month construction schedule, with four months at the end for final operational testing.[311] WFA/Basin Opening Nar. at III-F-107. As noted in Section III.F.3, there are some distinct disconnects between the overall proposed schedule and WFA/Basin's selection of delivery points for critical components such as ballast, subballast, and rail. These particular shortcomings are discussed in the pertinent sections.

Despite those issues, BNSF does not take issue with WFA/Basin's overall schedule because, although ambitious, it is consistent with SAC methodology accepted by the Board. It is based on the length of the longest project, which WFA/Basin identified as Tunnel #1. WFA/Basin have divided their construction schedule into several simultaneously constructed packages and use a reasonable estimate of the productivity rate for track gangs – *i.e.*, one-half mile per day which is consistent with BNSF's experience on the Orin Line. Therefore, BNSF Engineering Consultants have not made any attempt to adjust the schedule. Where there are issues related to the schedule, such as the number of delivery points for materials, BNSF Engineering Consultants have addressed them directly rather than through any adjustments to the schedule.

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[311] Although the construction schedule provides for operational testing, WFA/Basin's DCF does not recognize this adjustment and assumes construction will be completed just before operations commence.

b. Construction Costs North of Donkey Creek

As discussed fully in Section III.A.3.d, WFA/Basin seek to have traffic using only the LRR line segments north of Donkey Creek pay for facilities south of Donkey Creek that are used by the issue traffic. Such an assumption is inconsistent with SAC principles and with the cross-subsidy rational underlying the SAC analysis. BNSF has identified a relatively simple approach to the evaluation of SAC evidence in this case that allows the Board to ensure that the north-of-Donkey Creek traffic pays only for the facilities it uses. Specifically, the Board should assume that the construction costs of the north-of-Donkey Creek facilities and the operating costs of the north-of-Donkey Creek traffic are fully covered by the north-of-Donkey Creek traffic and that the south-of-Donkey Creek traffic is required to make no contribution to the cost of those facilities. Thus, consistent with this approach, the construction costs of the north-of-Donkey Creek facilities (as well as the operating costs and revenues for the north-of-Donkey Creek traffic) should be removed from the SAC analysis. BNSF Engineering Consultants, therefore, have identified the amount of investment costs that the LRR would avoid if it did not construct the north-of-Donkey Creek lines. BNSF's calculations are included in its electronic workpapers.[312]

The table below shows the difference in BNSF's restated Road Property Investment costs with and without the lines on the Campbell Subdivision.

[312] BNSF Reply electronic workpaper "III F LRR Construction.xls," worksheet "Total Cost XSub."

Table III.F.12-1
Comparison of BNSF Reply With Inclusion and Exclusion of RPI Attributable To Lines North of Donkey Creek (2004 $Millions)

Road Property Investment Account	BNSF Reply 2004 RPI ($Millions)	BNSF 2004 RPI Attributable to North of Donkey Creek ($Millions)	BNSF 2004 RPI W/O North of Donkey Creek RPI ($Millions)
III.F.1. Land	$7.34	$1.63	$5.71
III.F.2. Roadbed Preparation	$436.75	$78.52	$358.23
III.F. 3. Track (Rail, OTM, Ballast)	$409.12	$36.93	$372.19
III.F.4. Tunnels	$28.66	$0.00	$28.66
III.F.5. Bridges and Culverts	$99.41	$7.73	$91.68
III.F.6. Signals and Communications	$68.82	$9.45	$59.37
III.F.7. Buildings and Facilities	$51.65	$1.21	$50.44
III.F.8. Public Improvements	$8.59	$0.55	$8.04
III.F.9. Mobilization	$33.95	$4.27	$29.69
III.F.10. Engineering Costs	$110.30	$13.44	$96.86
III.F.11. Contingencies	$124.72	$15.21	$109.52
TOTAL NET CHANGE	**$1,379.31**	**$168.92**	**$1,210.38**

G. DISCOUNTED CASH FLOW ANALYSIS

1. Cost of Capital

a. WFA/Basin Cost of Preferred Equity

In its DCF analysis, WFA/Basin applies the average industry cost of capital from 2002-2004 to compute interest during the SARR construction period and applies the weighted average cost of capital during the construction period to cash flows during the 20-year DCF period. In developing its average cost of capital, however, WFA/Basin mistakenly assume that the cost of preferred equity for the years 2003 and 2004 are zero. In both its 2003 and 2004 determinations of the railroad cost of capital, the Board found that there was no preferred stock outstanding in either year.[1] It did not find, however, as WFA/Basin asserts, that the *cost* of preferred equity was zero. Rather, because there was no preferred equity stock outstanding, the Board was not required to determine its cost.

In Table III-G-1 of its opening narrative, WFA/Basin mischaracterize the Board's cost of capital findings by displaying both a zero percent weight for preferred equity and a zero percent cost of preferred equity for the years 2003 and 2004 as set forth below.

WFA/BASIN TABLE III-G-1
LRR COST OF CAPITAL

Capital Structure (1)	2002		2003		2004	
	% Weight (2)	% Cost (3)	% Weight (4)	% Cost (5)	% Weight (6)	% Cost (7)
1. Debt	41.2%	6.0%	42.8%	5.0%	38.5%	5.26%
2. Common Equity	56.7	12.6	57.2	12.7	61.5	13.16
3. Preferred Equity	2.1	6.3	**0.0**	**0.0**	**0.00**	**0.0**
4. Total	100.0%	9.7%	100.0%	9.4%	100.0%	10.12%

[1] *See Railroad Cost of Capital – 2003,* STB Ex Parte No. 558 (Sub-No. 7), at 8 (served June 28, 2004); *Railroad Cost of Capital – 2004*, STB Ex Parte No. 558 (Sub-No. 8), at 8 (served June 30, 2005).

The cost of capital figures displayed in the above table are also inputs to the Table A of the Board's standard discounted cash flow model. By asserting that the 2003 and 2004 costs of preferred equity are zero, WFA/Basin artificially dilute the average cost of equity used in the DCF model. In its restatement of WFA/Basin's SAC costs, BNSF has adjusted the formulas in the DCF model to apply the 2002 cost of preferred equity of 6.30 percent and to weight the cost of preferred equity using a 2.1 percent weighting for 2002 and a zero percent weighting for both 2003 and 2004.[2]

b. LRR Cost of Equity Financing

WFA/Basin's opening evidence is silent on the matter of equity financing fees and WFA/Basin have not included these costs in its analysis. As described in Section III.D.3.c.(4).(b), BNSF has included in the LRR investment significant fees that the LRR would be charged for floating equity. The current cost of capital for Class I railroads does not include them because no Class I railroad has raised new capital in the last three years by issuing new equity. Such fees must be included in the SAC analysis as a cost to the SARR – the same cost that any railroad would incur that sought to issue large amounts of equity.

The Board's own precedent demonstrates that railroad have incurred substantial fees in the past when they sought issue large amounts of equity. In its decision in *Railroad Cost of Capital – 1991*, 8 I.C.C. 2d 402, 414-15 (1992), the ICC found that during 1991, the Burlington Northern issued 10,350,000 shares of new common stock. The floatation costs incurred by Burlington Northern for the sale represented 3.87 percent of the proceeds per share, indicating

[2] In its conversion of the Board's DCF model from Lotus to Excel, WFA/Basin inserted a rounding function into certain of the formulas that calculate the composite cost of capital in column Y of DCF Table A. Because this rounding was not part of the Board's standard DCF model, BNSF has removed the rounding function from column Y of DCF Table A in its restatement.

that the 4.0 percent equity floatation cost included by BNSF in its restatement of LRR costs is reasonable.[3]

2. Inflation Indices

The prices of goods and services used by the LRR will change in future years, and it is necessary to reflect various rates of inflation for capital assets and operating expenses, over the useful life of the LRR, in order to recover properly those capital costs and operating expenses. Accordingly, forecasts of (1) operating expenses, (2) capital costs, and (3) land values are needed to run the 20-year DCF model and to compute overall stand-alone costs for the LRR.

a. Operating Expenses

WFA/Basin argue that stand-alone operating expenses should be indexed in a manner that reflects an expectation that the LRR will experience productivity improvements beginning in the first year of its operations and continuing throughout the 20-year DCF period. WFA/Basin Opening Nar. at III-G-15. WFA/Basin acknowledge that the Board has consistently rejected complainants' prior advocacy of the Board's Rail Cost Adjustment Factor adjusted for railroad productivity ("RCAF-A") as the mechanism for indexing stand-alone operating expenses. Here they instead offer the Board a "new and different choice" – the "0.53 RCAF-U". WFA describes the "0.53 RCAF-U" as a forecast {

}. WFA/Basin Opening Nar. at III-G-14.

[3] In its 1991 Cost of Capital determinations, which focused on the average cost of capital for the entire railroad industry, the ICC weighted the Burlington Northern equity floatation costs based on Burlington Northern's relative market share. Because it is the LRR – and not the railroad industry as a whole – that will incur these new equity floatation costs, it would not be appropriate, or logical, to dilute the floatation fee cost by spreading it over the outstanding equity of all Class I railroads.

(1) <u>WFA/Basin Offer No Evidence that the Proposed Index Reflects Likely Productivity Gains for a SARR</u>

WFA/Basin follow a two-pronged approach in advocating the new index. Based on irrelevant claims about the WRPI/UP experience and a speculative laundry list of rail industry improvements that might take place over the next twenty years, WFA/Basin first argue that the LRR is entitled to an index that affords it substantial productivity gains over the DCF period. WFA/Basin then posit that the new "0.53 RCAF-U" index should be adopted by the Board. Entirely absent from WFA/Basin's evidence is any demonstration that the specific index advocated appropriately reflects productivity gains or is in any way tied to a quantification of the productivity gains that a SARR might expect. Indeed, WFA/Basin make no effort to link the proposed index to the evidence they proffer as support for the claim that some productivity adjustment is required.

Instead, WFA/Basin essentially argue that the Board can adopt the "0.53 RCAF-U" index because the Board does not need to engage in reasoned decision making. The Board, WFA/Basin contend, can adopt the proposed index because adopting a "middle ground-approach," or attempting to "split the different [sic.]" is consistent with principles of rate regulation. WFA/Basin Opening Nar. at III-G-14 to 15. Splitting the baby in this manner "produces a fair result," according to WFA/Basin, "[i]n the absence of any empirical evidence to the contrary." *Id.* at III-G-15. In fact, the index advocated by WFA/Basin is not supported by any empirical evidence whatsoever, so it is difficult to understand how it could produce a "fair" result.

WFA/Basin also assert that using the index is "common sense" because the LRR is entitled to an index that provides for productivity improvements starting on its first day of operations and continuing throughout the DCF period. *Id.* Even if it might make sense to employ an index that allowed for some productivity improvements, that does not mean that it makes sense to use the specific index that WFA/Basin advocate. WFA/Basin have made no attempt to demonstrate that the index is a realistic measure of productivity improvements, so common sense obviously does not dictate that it is superior to other potential indexes. Moreover, if common sense had any role in the analysis, it would clearly dictate that no productivity gains should be assumed at the beginning of the DCF period for a railroad that was built using *only* the most modern and efficient equipment in existence.[4]

WFA/Basin's other arguments in support of their chosen index are equally specious. Although WFA/Basin do not ask that the Board use the operating cost index (based on UP internal forecasts) that the Board accepted in *Wisconsin Power & Light*, they contend that the "0.53 RCAF-U" index is "consistent" with *WPL*. WFA/Basin Opening Nar. at III-G-16 to 17. In fact, WFA/Basin's new index is more favorable to WFA/Basin than the 1.5% annual increase adopted by the Board in that case. WFA/Basin's argument appears to boil down to the notion that the approximate { } annual increase produced by their index is "consistent" with a 1.5% increase that the Board adopted in another case. This claim, even if it were true, would not justify use of an index that has no evidentiary support in the record of this case. Moreover, WFA/Basin have established no basis to believe that the SARR, which is a brand-new, highly-efficient and optimally designed railroad, would experience productivity growth similar to UP.

WFA/Basin also contend, based on comparisons to another index they have invented – the "RCAF-EIA," that the Board should view the "0.53 RCAF-U" index as "conservative."

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[4] In fact, it is likely that in the early years of its operation, the LRR will be less efficient than the smooth running, highly efficient system hypothesized in the BNSF operating plan, as its new employees become familiar with the railroad and its systems. This learning curve would actually generate negative productivity for the early years of operation. BNSF has conservatively not included additional costs for this negative productivity in its analysis.

WFA/Basin Opening Nar. at III-G-18 to 20. The "RCAF-EIA" is supposedly an RCAF adjusted for EIA's forecasts of future coal transportation productivity for western railroads. The Board has repeatedly rejected the notion that a SARR is entitled to expect productivity gains of the magnitude of those that could be achieved by an existing railroad, so it is entirely unclear why any comparison to an index predicated on predicted performance by existing railroads would be valid or useful. In any case, WFA/Basin do not advocate that the Board use this manufactured "RCAF-EIA index in any way, but have only set it up as a straw man designed to make the "0.53 RCAF-U" index appear reasonable. WFA/Basin's "0.53 RCAF-U" index, as applied to the LRR, is not reasonable. It would result in a SARR that starts out much more efficient than any real-world railroad – void of any excess or obsolete plant or outdated operating systems that are a key source of productivity improvement in the railroad industry – and that continues to experience productivity gains as if the base year efficiencies had not occurred.[5]

Finally, WFA/Basin contend that the Board should adopt the new index because "Dr. Caves endorses without reservation the use of the 0.53 RCAF-U index as a reasonable – indeed conservative – forecast of productivity-adjusted LRR operating costs." WFA/Basin Opening Nar. at III-G-21. The quoted sentence sets forth WFA/Basin's entire evidence concerning Dr. Caves' views on this issue. Such a bald assertion, devoid of and unsupported by any analysis, is entitled to no weight.

[5] Indeed, much of the productivity achieved by the railroad industry as a whole is the result of increases in traffic volumes that produce improved economies of scale. However, as explained below, because the LRR physical plant and operating plan are based on peak year traffic volumes, the LRR has already captured all of the available economies of scale.

(2) WFA/Basin Improperly Assume Productivity Gains for the SARR from Day One

WFA/Basin have offered the Board no sensible reason to accept the new index proffered. Moreover, WFA/Basin cannot explain away a fatal flaw at the heart of their approach: the assumption that the LRR is entitled to an index that reflects significant productivity gains from the day it begins operating. Missing from WFA/Basin's proposal is an acknowledgement that the LRR – as configured by WFA/Basin and as corrected by BNSF in its Reply Evidence – starts out substantially more efficient than existing railroads, such as the BNSF. In other words, much of the productivity improvement that might be anticipated for existing railroads generally – and in the transportation of coal movements more specifically – is reflected in the LRR operating expenses from the beginning. Indeed, under the approach advocated by WFA/Basin, the LRR stand-alone operating expenses would reflect substantially more productivity than BNSF has been and will likely ever be able to achieve on movements of coal in the PRB.

Because the LRR is designed as a brand-new, optimally efficient railroad, significant productivity improvements are already reflected in the LRR operating expenses. To demonstrate this, BNSF calculated the URCS-based fully allocated operating expenses attributable to the traffic moving over the LRR,[6] and compared those expenses to the base year stand-alone operating expenses (excluding the training costs that are anticipated for the LRR in year one) as calculated by BNSF. These calculations, which are summarized in the Table III.G-1 below,

[6] Stand-alone operating expenses include all operating expenses incurred by the LRR in handling its traffic. As such, they are directly comparable to BNSF's fully allocated URCS costs which themselves include an allocation of all costs incurred by BNSF in moving the same traffic. URCS based fully allocated operating were calculated for the on-SARR portion of all LRR traffic based on 2004 URCS system average variable costs adjusted to remove depreciation and lease expenses and return of road property investment costs and converted to the full cost level using the URCS constant mark-up ratio of 1.33. These costs were then indexed to 2005 levels.

show that the LRR starts out with a 13 percent improvement in productivity compared to the incumbent BNSF's unit coal train operations.[7]

Table III.G-1
Calculation of Productivity
Reflected in LRR Operating Expenses

BNSF Fully Allocated Operating Expenses For on-SARR Portion of LRR Traffic Base	$194.2M
LRR Base Year Operating Expenses (less year one training expenses)	$169.0M
LRR Productivity	$25.2M
Productivity Percentage	13%

All of this productivity occurs before any traffic is assumed to move on the LRR. Any attempt to impose additional productivity improvement as part of an annual operating expense inflation index, particularly in the early years of the LRR's operation, would be inappropriate and illogical.[8]

There is no sense in which WFA/Basin's "0.53 RCAF-U" is a "middle-ground" or "conservative" approach to including productivity in an inflation index. By seeking to apply a measure of productivity, from the very beginning of the LRR's life, to a railroad that would start out substantially more efficient than the existing railroads, WFA/Basin are advocating an extremely aggressive and unrealistic approach to determining the extent to which a SARR might be expected to achieve further improvements in productivity.

[7] Because unit coal train operations are already some of the most efficient movements on the BNSF system, it is unlikely that these operations will experience the same productivity rate going forward as BNSF's other traffic and indeed the railroad industry as a whole.

[8] Under WFA/Basin's operating plan – which BNSF's operating experts have deemed unworkable – the base year efficiency improvements are much more dramatic.

(3) <u>The WRPI Experience Does Not Justify Assuming that a SARR Would Achieve Additional Productivity Improvements from Inception</u>

In an effort to substantiate their view that even a most efficient railroad like the LRR will experience substantial incremental gains in productivity from the beginning, WFA/Basin cite to the experience of WRPI. There is no evidence in the record that the LRR, a fictional construct invented for purposes of this rate proceeding, resembles the real-world WRPI in any meaningful way or shares its operating characteristics and design. For example, there is certainly no evidence in the record that WRPI had a substantial cost advantage over other railroads when it entered the market as the LRR is presumed to have. Nor, as the Board has repeatedly ruled in rejecting use of the RCAF-A, is it proper to assume that a SARR – which starts out not only as a brand-new but also as an optimally efficient railroad that does not face many real world problems – would experience productivity gains of the same magnitude as more inefficient real-world railroads. The most that WFA/Basin's evidence shows is that WRPI, both before and after its acquisition by UP, achieved some productivity gains. That, however, is no surprise as it relates to a real-world railroad and is not relevant here.

(4) <u>Speculation as to Possible Sources of Productivity Improvements Does Not Constitute Evidence of the Productivity Gains a SARR Could Reasonably Achieve</u>

WFA/Basin speculate about numerous potential sources of productivity improvements in the rail industry, ranging from improved locomotives and railcars to improved IT systems to track-related efficiencies. WFA/Basin Opening Nar. at III-G-7 to 14. WFA/Basin do not tie this speculation to the "0.53 RCAF-U" index they advocate or otherwise attempt to quantify the productivity impact of potential future efficiencies. WFA/Basin's evidence on this topic is therefore irrelevant to determining what a SARR's future costs would be.

Nevertheless, it is worth noting several common threads that run through the examples that WFA/Basin have provided. First, all of the examples cited by WFA/Basin involve improvements that, if they were to happen at all, would happen only many years into the future. None suggest any justification for WFA/Basin's assumption that the LRR would begin seeing significant improvements in efficiency from the day operations begin. Second, with the possible exception of "traffic-based efficiencies," all of the modifications to improve productivity would involve substantial costs. WFA/Basin have not attempted to reflect the costs of achieving enhanced productivity in their DCF model, but instead appear to believe that all of the new technologies could be implemented for free on the LRR. This position is obviously baseless and would distort the stand-alone analysis by permitting the LRR to achieve productivity gains without paying the costs associated with those gains. A few examples taken from WFA/Basin's evidence serve to illustrate these points.

WFA/Basin claim that one source of future productivity gains will be replacement of the top of the line SD 70-MAC locomotives assumed to be deployed on the LRR with yet to be developed higher horsepower, more fuel efficient and less costly to maintain units. WFA/Basin Opening Nar. at III-G-7. Even if such locomotives were ever to become available, any productivity gains could not be realized until years into the future. Moreover, WFA/Basin has not made any effort to quantify the cost to the LRR of shifting to newer locomotives. WFA/Basin have assumed low operating costs for the LRR by relying on existing low-cost, long-term leases that span the DCF period. There would obviously be costs associated with disposing of leased SD 70-MACs early in order to replace them with new locomotives.[9]

[9] Section 10 of the equipment lease agreement relied upon by WFA/Basin sets forth the obligations of the lessee in the event of voluntary termination of the lease agreement. *See* BNSF reply electronic workpaper "Lease.pdf."

Moreover, the cost at which those new locomotives could be obtained is unknown, but would likely be higher than the lease cost now built in to the stand-alone cost analysis.

Curiously, one of the locomotive improvements that WFA/Basin suggest would benefit the LRR — the future deployment of 6,000 horsepower locomotives — is a technology that has already come and gone.[10] While there were some 6,000 horsepower units built in the late 1990s, issues with reliability and usefulness halted any future production very quickly. As the table below shows, only a small number of 6,000 horsepower units have been manufactured over the 1996 through 2003 time period, with most of those produced between 1998 and 2000. No 6,000 horsepower units have been manufactured since the year 2000.

Table III.G-2

Locomotives with a Horse Power of 4,000 or greater
Quantitites Built
1996 through 2003

	HP	1996	1997	1998	1999	2000	2001	2002	2003	8 Year Total
C40-9W	4000	120	120	118	148	190	160	0	67	923
C44-9W	4400	140	192	325	368	272	107	182	165	1751
AC4400CW	4400	238	292	268	299	235	187	277	256	2052
AC4400CW (Tier II)	4400	0	0	0	0	0	0	3	26	29
AC4400CW(U)	4380	35	0	36	0	0	0	0	0	71
AC6000CW	**6000**	**0**	**0**	**48**	**100**	**45**	**0**	**0**	**0**	**193**
SD70M	4000	0	0	24	22	305	423	418	130	1322
SD70MAC	4000	61	115	154	234	92	0	0	30	686
SD70ACe	4300	0	0	0	0	0	0	0	4	4
SD75I	4300	105	61	0	41	0	0	0	0	207
SD75M	4300	21	0	0	0	0	0	0	0	21
SD80MAC	5000	22	0	0	0	1	0	0	0	23
SD90MAC(U)	4300	72	104	143	79	9	0	0	0	407
SD90MAC	**6000**	**2**	**6**	**9**	**51**	**0**	**0**	**0**	**0**	**68**

Source: Extra 2200 South, Issues 116, 118, 121, 123, 124, 125 and 126

In addition, even if these 6,000 horsepower units were to become readily available, trains on the LRR are configured to operate efficiently with 3 4,400 horsepower units, or a total of

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[10] WFA/Basin assert that "6000 horsepower locomotives are now being built and tested," but cite a nine year old GE Annual Report as support. *See* WFA/Basin Opening Nar. at III-G-7 n.12. Obviously a "new" technology that was being built and tested nine years ago would have been built into the SARR if doing so was necessary to achieve an optimally efficient SARR.

13,200 horsepower. Two 6,000 horsepower units (totaling 12,000 horsepower) would be inadequate for the LRR trains while three 6,000 units (totaling 18,000 horsepower) would be overkill and no efficiencies would be gained.[11]

WFA/Basin also cite as a potential source of LRR productivity that the rail industry "is actively beginning to use 315,000 gross weight on rail coal cars." WFA/Basin Opening Nar. at III-G-8. If using higher gross-weight cars were more efficient, and the technology to do so is already in place, presumably the LRR would have been designed to handle the heavier cars. WFA/Basin, however, designed the LRR "to accommodate a gross weight on rail ("GWR") of 286,000 pounds per car." WFA/Basin Opening Nar. at III-B-7. As with the locomotive example, WFA/Basin have ignored the substantial capital expenditures necessary to upgrade the LRR track and structures to accommodate the heavier loadings. In addition, any productivity gains could only be realized at some point in the distant future after the necessary upgrades have been completed.

Other sources of future productivity gains identified by WFA/Basin would also require substantial expenditures to implement and could not be realized in the near term. WFA/Basin argue, for example, that the LRR will deploy longer train sizes "when it becomes economically and technically feasible to do so." WFA/Basin Opening Nar. at III-G-9 to 10. The LRR as designed, however, will only accommodate current train sizes on its passing tracks, yard tracks and staging tracks. In addition, the infrastructure beyond the boundaries of the LRR including the mine lead tracks, staging tracks, the track configurations at each destination utility and the passing siding lengths on the residual BNSF could not accommodate longer train sizes. Therefore, LRR train sizes could not be increased without incurring additional capital

[11] *See*, Extra 2200 South – Issue 126, July 31, 2004 at 8.

expenditures – both on and off the LRR – to lengthen tracks and that process could not be completed for many years.

The same points apply to new technologies WFA/Basin assert could be implemented at some point to "reduce stress on, and increase the operating life of, track and roadbed infrastructure." WFA/Basin Opening Nar. at III-G-13. The LRR would incur costs that are not reflected in the stand-alone cost analysis to implement any of these technologies. Any implementation is years away and would not produce productivity gains in the near future.

(5) Modifying the Operating Cost Index in Later Years Appropriately Captures Productivity Improvements that Could Be Experienced by a SARR.

To address the Board's concerns raised in recent decisions that some level of productivity might occur on a SARR at some point during the 20-year DCF period, while taking into account the substantial amount of productivity already reflected in the LRR operating expenses, BNSF specifically evaluated each of the LRR operating expense categories to determine the likelihood of future productivity improvement in each category. Consistent with the general categories of typical railroad productivity identified by EIA, and taking into account the Board's finding in *WPL* that future productivity gains could be realized as new technology develops, BNSF's review focused on the potential technological improvements that could increase productivity. Each expense category is discussed below.

Train & Engine Personnel – This expense category includes the wages and fringe benefits of LRR train and engine personnel, along with expenses for overnight layovers, meals and taxis. Because the train and engine personnel counts in the base year are derived from an assumed annual number of crew starts per year that already reflects an extremely high level of utilization, there is little room for future productivity improvement. While there is some speculation within the industry that one-person crews might someday be possible in some circumstances, safety issues remain a primary impediment, and any effort to move in this direction would likely be opposed by labor groups and local governments. As such, a transition from two-person to one-person crews is too speculative at this time to be considered a realistic source of productivity improvement for the LRR.

Locomotive Lease Expense – This category includes the lease expenses for the LRR road and switching locomotives. The leased locomotive counts reflect the number of units required to efficiently handle the LRR unit-coal-train operations and the limited switching that will occur. WFA/Basin's annual lease payments are based on a long-term, 22-year lease that would extend beyond the DCF period. Under the terms of the lease, the lessor is not required to upgrade the locomotives as more technologically advanced units become available, and if the LRR sought to return the locomotives before the end of the 22-year term of the lease – in order to acquire more technologically advanced units – it would pay a financial penalty. Thus, there is no opportunity for LRR productivity improvement in this category.

Locomotive Maintenance Expense – This category includes the annual maintenance costs for the LRR locomotive fleet. Although the maintenance of an SD70MAC is presently an efficient operation, BNSF concedes that it is possible that future improvements in productivity could occur on the LRR. These productivity improvements, however, will likely be offset by additional maintenance costs as the LRR locomotive fleet ages.

Locomotive Operating Expense – This cost – which covers fuel and servicing the LRR locomotive fleet – is driven primarily by the number of locomotive unit-miles and the gallons of diesel fuel consumed. Because the LRR traffic patterns remain relatively consistent over the 20-year DCF period and the locomotive fleet remains unchanged, there is only minimal opportunity for the LRR to increase the number of locomotive miles per unit, or to improve average locomotive fuel consumption. In fact, future environmental considerations could adversely affect such expenses, because compliance with newly proposed fuel emission standards for locomotives could result in higher fuel consumption rates.[12]

Railcar Lease – These costs include coal car lease rates. Like locomotives, WFA/Basin assumed that LRR cars are acquired on the basis of a long term lease. In addition, in developing its 2024 peak-year operating parameters, WFA/Basin explicitly assumed that the loadings per car would be the same as those achieved today, indicating that the freight car fleet will remain homogenous over the 20-year DCF period.

Material and Supplies Operating – This category includes vehicles, office furniture, radios, safety equipment, car inspection supplies and car parts inventory. BNSF concedes that it is possible that some technological improvement will occur in this category over the DCF period as these assets are replaced.

Ad Valorem Taxes – There is no reason to expect productivity improvements related to ad valorem tax payments.

Training and Startup – This category includes training costs for new LRR employees. It is possible that some technological improvements could occur in the training area, leading to improved productivity.

Operating Managers – Included in this category are salaries and wages for non-train operating personnel. Staffing for these positions on the LRR are based on a careful evaluation of each position's requirements, considering the safety standards of the LRR and taking into account all available efficiencies. Accordingly, there is little opportunity for additional productivity.

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[12] *See* "EPA Issuing Tough New Diesel Rules," Washington Post, May 11, 2004 at 3.

General and Administrative – This category includes all of the general and administrative staff, office buildings, materials and supplies, outside services, information technology and travel expenses. As explained in Section III.D.3, the LRR's expenses already reflect significant efficiency gains over the current general and administrative cost structure of the railroad industry. Information technology would likely benefit from technological improvements at some future point.

Loss and Damage -- There is no reason to expect productivity improvements related to loss and damage payments.

Insurance – There is no reason to expect productivity improvements related to insurance premium payments. However, because these costs are determined as a percentage of all other operating expenses, they will explicitly reflect productivity gains in all areas.

Maintenance of Way – This category includes all maintenance-of-way operating expenses including personnel, equipment, contract cost and miscellaneous materials. The maintenance-of-way plan for the LRR is tailored to the LRR's specific track and traffic characteristics, and it already reflects state-of-the-art equipment and maintenance of way practices. There is, however, the potential that additional technological improvements over time could result in increased maintenance-of-way productivity.

Based on these category-specific evaluations, BNSF determined that there is a possibility that productivity improvements could occur in the future in some of the LRR operating expense categories, and that some small adjustment to the operating expense inflation index to reflect future productivity could be justified. Therefore, BNSF has adjusted the DCF model to apply the RCAF adjusted for productivity, beginning half-way through the DCF period, *i.e.* beginning in the eleventh full year, to the following categories:

- Locomotive Maintenance;
- Materials and Supplies Operating;
- Training Costs;
- General and Administrative (IT portion only); and
- Maintenance of Way.

The mid-point of the DCF period was selected to reflect the fact that LRR operating expenses are based on the Board's least cost, most efficient stand-alone cost standard and already include a substantial productivity adjustment downward from BNSF's fully allocated operating expenses.

The following table compares total LRR operating expenses developed by BNSF, including application of its productivity adjustment to the above categories of operating expenses beginning in year 11, to LRR operating expenses unadjusted for productivity.

Table III.G-3
Effect of Including Productivity in Forecasting Certain Categories of LRR Operating Expenses

Full Year	LRR Operating Expenses Assuming No Improvement in Productivity	LRR Operating Expenses Assuming Productivity Improvements in Certain Categories of Expense Beginning in the Eleventh Full Year
1-10	No difference in calculated operating expenses.	
11	228.00	227.19
12	235.08	232.94
13	242.42	238.90
14	250.10	245.15
15	258.29	251.85
16	266.22	258.24
17	274.50	264.92
18	283.16	271.92
19	292.18	279.22
20	225.27	214.37

b. Road Property Assets Other than Land

The annual inflation forecast used by WFA/Basin to calculate the value of the LRR's road property assets is based on a Global Insights December 2004 forecast for rail labor and rail materials and supplies. As WFA/Basin point out, this is the same procedure utilized by the Board in *Duke/NS* and *CP&L/NS*. BNSF accepts WFA/Basin' procedure, but updates the forecast to use the Global Insights March 2005 forecast.

c. Land

In its Opening Evidence, WFA/Basin used a composite index for all land owned by the LRR. In its reply, BNSF adopts WFA/Basin's land inflation value.

3. Tax Liability

As did WFA/Basin, BNSF has calculated federal taxes payable by the LRR in a manner consistent with the approaches approved by the Board in prior maximum rate cases. *See*, *e.g.*, *FMC* at 848; *WTU* at 714. The LRR is assumed to pay federal taxes at the corporate rate of 35%, with payments for debt interest, depreciation expense, and state income taxes treated as deductibles. The LRR is located in the state of Wyoming, which does not have a corporate income tax and, as such, will not pay state income taxes.

4. Asset Lives

The asset lives used by WFA/Basin are derived from the BNSF system average lives as reported in its 2004 Annual Report R-1. BNSF accepts the asset life assumptions used by WFA/Basin with one exception. As discussed in Section III-F, a portion of the LRR would be constructed with concrete ties, which have a longer average life than wood ties. Overall, 83 percent of the track of the LRR will be built with concrete ties while the other 13 percent will be built with wood ties. BNSF computed a composite life of 25 years for ties based on the 2004 average depreciation rates for concrete and wood ties in track density category 1, weighted by the relative percentage of concrete and wood ties.

5. Other – Capital Cost Recovery

The Board's DCF methodology uses economic depreciation to calculate the capital recovery cost of the stand-alone entity's property. The value of an asset at any point in time thus equals the discounted present value of the earnings that it will produce over its remaining useful life. Although not mentioned at all in its Narrative, in this proceeding WFA/Basin modified the Board's standard capital recovery procedures in a number of ways. These include:

- Changing the Board's prior procedures that amortized debt over the DCF period to a term equal to the average life of the stand-alone road property assets.
- Converting the DCF model from Lotus to Excel.
- Inclusion of training expenses with road property investment.
- Changing the Board's prior procedures that normalize maintenance expenses over 20-years.
- Assuming all rail grinding is capitalized and adding rail grinding costs to the amount of capital to be recovered by the DCF.
- Assuming all maintenance of way work equipment is capitalized and adding a line for work equipment within the DCF.

BNSF's treatment of each change is described in the remainder of this section.

a. Change of the Board's Debt Amortization Procedures

It is the Board's standard practice since *Coal Trading* to amortize stand-alone debt over the 20-year DCF period.[13] Without any discussion, WFA/Basin change that long standing precedent to amortize the debt of the LRR over 200 quarters, which is described in a footnote to

[13] In *Nevada Power*, the DCF period extended for 25 years.

the DCF as the "weighted life of assets."[14] WFA/Basin have not demonstrated that financing could be obtained for the 50-year term it assumes, nor is it likely such financing could be arranged. In its Reply, BNSF amortizes LRR debt over the DCF period, consistent with the Board's prior practices.

b. Conversion of the DCF to Excel

WFA/Basin' conversion of the DCF from Lotus to Excel is straightforward. On Reply, BNSF accepts WFA/Basin' conversion of the DCF to Excel, corrected to remove the rounding function in the Cost of Capital tab discussed above.[15]

c. Inclusion of Training Expenses With Road Property Investment

WFA/Basin adds to the LRR road property ownership costs the expenses related to training of the LRR employees. Training costs are an SARR operating expense and have been consistently treated by the Board as such. BNSF includes its training costs with the LRR operating expenses consistent with the Board's treatment in *TMPA, Duke/NS, CP&L/NS and Xcel.*

In attempting to defend their position that start-up expenses should be capitalized, WFA/Basin cite correctly to the Accounting Standards Executive Committee April 3, 1988 Statement of Position 98-5 Reporting on Costs of Start-up Activities[16] and its conclusion that GAAP requires costs of start-up activities and organization costs to be expensed as incurred. WFA/Basin then launch into a seemingly circular argument that the Accounting Standards

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[14] *See* WFA/Basin electronic work paper "Exhibit III-H-IR.xls," worksheet "Amortization", footnote 5.

[15] The Lotus version of the DCF used a macro to solve for the DCF starting revenue requirement. The Excel version uses a solver function which is an add-in feature of the Excel software package.

[16] ("SOP 98-5") BNSF reply electronic workpaper "Support for expensing start-up costs.doc."

Executive Committee conclusions relating to the proposed treatment of start-up expenses under GAAP, in fact, is a violation of GAAP. WFA/Basin contends that because these expenses are incurred before LRR operation commence (and thus before the LRR begins to generate revenues), treating them as expenses violates the GAAP matching rule.

However, from SOP 98-5 it is clear that the start-up costs are to be treated as expenses including those "preopening/preoperating" start-up costs that are incurred before the commencement of operations as well as those that are incurred after operations have begun but before normal productive capacity is reached.[17] Start-up cost addressed specifically by SOP 98-5 are precisely the types of costs reflected in the LRR training and start-up costs and include the following:

- Travel costs, employee salary-related costs, and consulting costs related to feasibility studies, accounting, legal, tax and governmental affairs
- Training of local employees related to production, maintenance, computer systems, engineering, finance, and operations
- Recruiting, organization, and training related to establishing a distribution network
- Nonrecurring operating losses
- Depreciation, if any, of new computer data terminals and other communications devices

d. Changing of the Board's Prior Procedures for Treating Maintenance of Way Costs

As discussed in Section III.D.4, WFA/Basin, without explanation, deviated from the Board's prior practices for its treatment of stand-alone maintenance of way expenses. Instead of calculating a normalized estimate of maintenance of way expenditures over the 20-year DCF period as has been the Board's standard practice, WFA/Basin purports to develop a maintenance

[17] SOP 98-5, section .29 and .30.

of way organization and associated expenditures to accommodate year 2024 traffic levels and then indexes the staffing levels and expenditures back to base year levels. In the process, WFA/Basin changed the formulas in the Board's DCF model to index the stand-alone maintenance of way expenses by forecasted annual changes in tonnage volumes. BNSF explains in section III.D.(4) why this approach is inappropriate when applied to MOW expenses. BNSF corrected the formulas in WFA/Basin's DCF to treat maintenance of way expenses consistent with prior Board precedent.

e. Capitalizing Rail Grinding

Although not discussed anywhere in Sections III-G or III-H of its opening narrative, WFA/Basin modify the Board's standard DCF procedures to add the present value of capital expenditures for rail grinding that will occur during the 20-year DCF period to the total investment that will be recovered within the DCF. WFA/Basin add these costs to the "4Q2004 Road Property Investment" in the "Investment SAC" tab of the DCF. For this proceeding, BNSF accepts WFA/Basin's treatment of rail grinding costs, but, as discussed in Section III-D-4, BNSF corrects WFA/Basin's calculations to reflect the appropriate cost and frequency of the required rail grinding and to make the present value calculations consistent with other DCF assumptions.

f. Capitalizing Maintenance of Way Work Equipment

WFA/Basin replaces the line for Account 16 – Stations and Office Buildings in the Board's standard DCF model with Account 37 – Roadway Equipment, which it assumes the LRR will capitalize. As explained in Section III.D.4, the roadway equipment prices used by WFA/Basin to develop the capital investment for roadway equipment are flawed. BNSF's maintenance of way experts reject WFA/Basin's equipment unit costs and rely instead on annualized equipment ownership costs developed from a BNSF special study. These annualized ownership costs are included as maintenance of way operating expenses. In its restatement, BNSF has reinstated the line in the Board's DCF for Account 16 – Station and Office Buildings.

H. RESULTS OF SAC ANALYSIS

1. Summary of DCF Analsysis

As discussed in Section III.G, BNSF has calculated the LRR's cost of moving coal to WFA's Laramie River facility. The results of those calculations, using revenues based on Professor Kalt's contestability analysis and corrected for the cross-subsidy generated by northern PRB traffic, are summarized in table III.H-1 and set out in detail in Exhibit III.H-1. The following paragraphs describe the contents of Exhibit III.H-1.[1]

a. Road Property Investment Values

The calculation of road property investment costs is based on construction cost as of October 1, 2004. This calculation is summarized in Table C. The investment cost incorporates the amount of investment the residual LRR would be required to incur for the procurement of equity financing.

b. Interest During Construction

Interest During Construction ("IDC") accrues on the assets of the LRR. Table D contains both the total IDC amount and the IDC amount that is debt-related. IDC is calculated based on the investment values in Table C, the composite cost of capital from Table A, and the length of finance period for each account. The construction schedule described in Section III.F determines the length of the finance period for each asset account. The amount of IDC that is debt-related is calculated by multiplying the investment by the length of the finance period, the LRR's

[1] The following paragraphs describing the contents of Exhibit III.H-1 also apply to Exhibit III.H-2, which presents a separate DCF analysis based on the Board's MSP methodology but applying a 25 mile block instead of a 100 mile block. *See* Section III.A.(3).(c).(v). Exhibit III.H-2 also corrects for cross-subsidies. DCF results for each of these analyses that do not correct for cross-subsidy are contained in BNSF reply electronic workpapers "Full SARR 1.xls" and "Full SARR 2.xls."

percentage of debt, and the cost of debt. For tax purposes, the debt-related IDC is shown as an interest deduction during the construction period.

c. Amortization Schedule of Assets Purchased With Debt Capital

Table E is the amortization schedule for the debt-related portion of the LRR's investment. The debt principal is developed by multiplying the debt percentage from Table A – for the appropriate investment period – by the sum of the total investment and the interest during construction. The quarterly annuity payment is then calculated based on the principal, the debt rate from Table A, and the DCF model life of 80 quarters. The amount of interest included in the quarterly payment is calculated by multiplying the beginning balance (*i.e.*, the principal in the first period) by the interest rate.

d. Present Value of Replacement Cost

Table F calculates the additional investment (on a present value basis) the LRR would have to make if the hypothetical railroad replaced each asset indefinitely at the end of each asset's life. This additional investment is added to the initial investment in Table I prior to determining the quarterly cash flows.

e. Tax Depreciation Schedules

Table G displays the tax depreciation required under the Federal Tax Code currently in effect.[2] Investment in communications (Account 26), signals and interlockers (Account 27), and the track accounts (Accounts 8-12) was depreciated over seven (7) years employing a 200 percent declining balance methodology switching to straight-line depreciation when the straight line percentage exceeds the declining balance percentage. Investment in bridges and culverts (Account 6), public improvements (Account 39), fences and roadway signs (Account 13),

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[2] The mandatory method for depreciating most tangible property placed in service after December 31, 1986 is the Modified Accelerated Cost Recovery System ("MACRS").

roadway buildings (Account 17), fuel stations (Account 19), shops and enginehouses (Account 20) and public improvements (Account 39) was depreciated over 15 years using a 150 percent declining balance method switching to straight-line depreciation. Investment in grading (Account 3) was amortized over 50 years using straight-line amortization. Engineering (Account 1) and Roadway Equipment (Account 37) were amortized over five (5) years using straight line amortization.

f. Average Annual Inflation In Asset Prices

Table H calculates the average annual inflation rate that is applied to the capital recovery charge in Table I. The weighted average inflation rate was used because Table H calculates the required capital recovery necessary to return the investment. All road property accounts are indexed at the quarterly rates shown in Table B. The weighted average inflation rates are based on the inflation indexes discussed above in Section III.G.

g. Discounted Cash Flow

Table I displays the calculation of the capital carrying charge and associated flow of funds required to recover the total road property investment. Inputs to this spreadsheet were taken from the tables described above. The quarterly capital recovery stream reflects the tax benefits associated with interest on the investment financed with debt from Table E and the road property tax depreciation from Table G. The cash flow shown in Column (8) of Table I is the amount remaining each quarter after the payment of federal and state tax liabilities. This cash flow is used for payment of return on and return of total investment in the LRR. This quarterly figure is then discounted by the fourth root of the composite annual cost of capital from Table A, adjusted to reflect the asset being placed in service on October 1, 2004. The present value cash flow is then summed for each quarter along with the future cash flow and the total equals the total cost that must be recovered. The future cash flow is the residual value of the unconsumed assets of the LRR and serves to reflect the cash flow required to account for the value of the assets not consumed during the life of the DCF model.

The development of the quarterly levelized capital carrying charge requirement is a relatively simple calculation, *i.e.*, starting capital carrying charge requirement multiplied by the quarterly index factor from Table H that will recover total investment during the DCF model period. The starting capital carrying charge requirement that recovers the total investment is developed through an iterative process in which an arbitrary starting cost per ton is adjusted upward or downward as necessary until the starting quarterly charge yields a cumulative present value cash flow that just equals the required investment.

h. Computation Of Tax Liability -- Taxable Income

Table J - Part 1 displays the calculation of the LRR federal tax liability. The procedures followed to develop the federal tax liability are those discussed in Section III.G.3. Table J - Part 2 displays the calculation of the LRR state income tax liability, as discussed in Section III.G.

i. Operating Expenses

Table K displays the operating expenses incurred in each year of the LRR's operation based on the traffic levels described earlier. Table K uses the annual operating costs, states them on a quarterly basis, and indexes them to reflect inflation over the life of the LRR based on the RCAF-U inflation adjusted for productivity that might be expected to be incurred by the LRR.

j. Summary of SAC

The total SAC for the LRR based on investment and operating costs is summarized in Table L of Exhibit III.H-1. The capital requirement from Table I and the annual operating expenses from Table K are presented and summed in Table L for each year the LRR operates. The following tables summarizes these results in a manner consistent with contestability theory by showing separately the LRR's revenue requirements (stand-alone costs), the amount of revenue available from cross-over shippers, the amount of revenue that would be required from end-to-end shippers (here Laramie River), the amount of revenue actually available from the end-to-end shippers, and the shortfall.

Table III.H-1
Summary of Stand-Alone Cost Results – LRR
(All Figures in Millions of Dollars)

Year	SAC Requirement	Revenues Available from Cross-Over Traffic	Amount to be Recovered From End to End Shippers	Issue Traffic Revenues	Overpay (Underpay)	PV Overpay (Underpay)
2004 Q4	$81.4	$35.0	$46.4	$14.2	($32.3)	($31.9)
2005	$285.1	$150.8	$134.3	$54.7	($79.6)	($74.4)
2006	$288.9	$147.5	$141.4	$60.9	($80.4)	($68.6)
2007	$294.0	$147.0	$147.0	$69.3	($77.7)	($60.6)
2008	$300.7	$147.6	$153.1	$71.3	($81.8)	($58.2)
2009	$307.6	$151.8	$155.9	$72.7	($83.1)	($54.0)
2010	$315.2	$153.5	$161.7	$74.3	($87.4)	($51.8)
2011	$323.7	$156.0	$167.7	$76.3	($91.5)	($49.5)
2012	$332.3	$157.7	$174.6	$78.4	($96.2)	($47.6)
2013	$340.6	$158.4	$182.2	$80.8	($101.3)	($45.8)
2014	$348.7	$158.8	$189.9	$82.7	($107.2)	($44.2)
2015	$357.3	$160.5	$196.8	$86.6	($110.2)	($41.5)
2016	$366.0	$161.8	$204.2	$89.6	($114.6)	($39.4)
2017	$375.0	$163.5	$211.6	$92.7	($118.9)	($37.3)
2018	$384.4	$165.2	$219.1	$95.8	($123.3)	($35.4)
2019	$394.3	$167.4	$226.9	$99.1	($127.8)	($33.5)
2020	$403.9	$169.0	$235.0	$102.8	($132.1)	($31.6)
2021	$414.0	$170.7	$243.3	$106.7	($136.5)	($29.8)
2022	$424.4	$172.6	$251.8	$110.7	($141.1)	($28.1)
2023	$435.3	$174.7	$260.6	$114.8	($145.8)	($26.6)
2024 Q1 - Q3	$333.8	$132.6	$201.3	$89.3	($112.0)	($19.0)

As noted above, the full results of the SAC analysis are contained in Exhibit III.H-1.

2. Calculation of Rate Reduction

BNSF witness Joseph Kalt has submitted a statement which is set forth in its entirety as BNSF Reply Exhibit III.A-1. Although BNSF's evidence shows that no reduction in rates is warranted, Professor Kalt is sponsoring evidence concerning the proper approach to calculating reduced rates, defects in the Board's current percentage reduction approach, and the invalidity of proposed rate reduction methodologies proffered by WFA/Basin. The portions of Professor Kalt's statement relating to these issues are incorporated into the Reply Narrative in this section.

a. Rate Reduction Methodologies I: Rate Prescription as a Direct Product of SAC Analysis

Professor Kalt's analysis of the implications of the economics of contestable markets for rates and revenue on cross-over traffic makes it clear that the principles of contestability provide relatively straightforward guidance on how to establish cross-over revenues and on how to avoid gaming by complainants when they design SARRs. At the same time, answering the question of proper cross-over revenue answers the question of the proper CMP revenue for the issue traffic. In the case of the LRR, the proper CMP revenue emerges directly as the difference between the LRR's total costs and the aggregate revenue attributable to the LRR's non-issue traffic (which is entirely cross-over traffic in this case). This difference between total costs and total revenue from non-issue traffic (if positive) is the amount of revenue that the issue traffic would have to generate in order for the LRR to be able to stand alone and survive by realizing revenues that cover expenses plus a reasonable return on capital. If the associated rate for the issue traffic is less than the challenged rate, then a rate reduction to the issue traffic rate is warranted under SAC analysis.

The reason that SAC rates on cross-over traffic and SAC rates needed from the issue traffic both fall out directly and simultaneously from the application of the economics of contestability under the *Guidelines* is because these economics go directly to the question of prices that competitive behavior under contestability would yield. And prices (rates) are the ultimate objective of SAC analysis. No further inquiry into some separate rate reduction methodology is called for; the SAC rate for the issue traffic is a direct end product of application of contestability economics. An example illustrates the result: Suppose that a LRR-type SARR (*i.e.*, with its only through traffic being the challenged traffic and the remainder being cross-over traffic) had total costs (fixed and variable) of $1,000,000, and that application of the contestability standard yielded revenues on cross-over traffic equal to the incumbent's avoided costs of, say, $950,000. No further revenue allocation rule need be applied to the cross-over traffic; cross-over traffic yields $950,000 in revenue. It follows then that the issue traffic must yield $50,000 in order for the SARR to break even and survive as a stand alone railroad. If the challenged rate on the issue traffic were to generate, say, $60,000 in revenue, a rate reduction to the SAC revenue level of $50,000 would be called for. On the other hand, if the challenged rate on the issue traffic were to generate, say, $40,000, no rate reduction would be warranted. No rule like "percentage reduction" is needed by or emanates from the application of contestability under the *Guidelines*.

BNSF witness Baranowski summarizes the results of applying the foregoing economics to the LRR in BNSF Reply Exhibit III.H-1. In the underlying analysis, cross-over revenues are valued at BNSF's avoided cost, utilizing URCS-based measures as the proxy for such costs. Reasonable parameters for the LRR's structure, costs, and operations are then used to derive the difference between total costs and all revenue "realized" on LRR's non-issue traffic. This residual *is* the SAC revenue that the issue traffic would have to generate to make the LRR break even and stand alone as a sustainable railroad. Comparing this SAC-needed revenue on the issue traffic to the revenue expected to be generated under BNSF's challenged rate produces a negative number in each year. That is, when SAC revenues from cross-over traffic are looked at in a framework that is consistent with the economics of the *Guidelines*, BNSF finds that its proposed rates on the issue traffic do not exceed the SAC-defined reasonable maximum. This consistent application of the economics of the *Guidelines* and SAC analysis avoids the nonsensical conclusions embodied in the claimants' analysis and approach. It is the answer that flows from the *Guidelines*.

b. Rate Reduction Methodologies II: Competing Alternatives to the Economic Principles of the *Guidelines*

Recent SAC proceedings have not relied upon the economics of contestable markets embodied in the *Guidelines* to address issues related to SARR revenues on cross-over traffic and the appropriate rate reduction if SARR revenues exceed SAC. Instead, these cases have employed rate reduction methodologies divorced from the economics of contestability that operate by (1) finding an aggregate amount, if any, by which total SARR revenues exceed total SARR costs (with non-issue revenues for cross-over traffic movements calculated on the basis of MSP), and (2) if an excess is found, using the "percent reduction" method to determine the amount by which the issue traffic rates should be reduced as a result.[3]

The percent reduction method has been used in every SAC proceeding since the ICC's decision in *Coal Trading,*[4] and until recently has been accepted as an appropriate mechanism by railroads and shippers alike. In adopting this rate reduction procedure in *Coal Trading*, the ICC observed that "[t]he rate structure exhibited by the defendants over the complaint period is the necessary consequence of differential pricing and cost of service. Any revision to rates due to

[3] *CP&L/NS* at 30-31, 33; *Xcel* at 36-39.

[4] *Coal Trading* at ¶184 (hereinafter "*Coal Trading*").

the imposition of rate prescriptions should, to the extent possible, retain the underlying relationships. Thus, overcharges must be distributed to the SARR traffic group in a manner which will not substantially change rate relationships and, thus, disrupt the existing pattern of differential pricing unless it is demonstrated that the pattern is seriously flawed."[5] The ICC and the Board have repeatedly noted that maintaining existing rate relationships has been a primary goal of the percent reduction methodology.[6]

In several recent cases, however, complaining shippers have argued that a variety of rate reduction methodologies should be substituted for the percent reduction methodology. Significantly, these shippers generally have not taken exception to the fundamental rationale articulated by the ICC when it initially adopted the methodology. Instead, they argue that using the railroad-established rate as the starting point for a rate reduction calculation, as is done under the percent reduction method, facilitates "gaming" of the SAC test by railroads. The Board has recognized the potential that exists for either railroads or shippers to game the SAC process.

As explained in Professor Kalt's opening testimony, the rate set by BNSF for coal movements to the Laramie River plant reflects BNSF's analysis of the market conditions facing the Laramie River Station and the need for differential pricing, not an effort by BNSF to game the SAC process. Under these circumstances, there is no justification for the Board to abandon a rate reduction methodology that has stood the test of time, particularly because – as is discussed below – the alternatives proposed by the complainants in this proceeding are so substantially flawed.

It is important to recognize, however, that in the area of rate reduction, shippers' increasing reliance on SARR traffic groups dominated by cross-over traffic has introduced a

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[5] *Coal Trading* at ¶170.

[6] *CP&L/NS Decision* at 30-31; *Xcel* at 36-37.

distortion in the application of the percent reduction method. At the time the ICC adopted this procedure in *Coal Trading*, and for several years afterwards, stand-alone cost tests were conducted with little or no cross-over traffic. But as cross-over traffic has come to compose the vast majority of SARR traffic groups in individual SAC analyses, the percent reduction methodology has not adapted. As a result, the percent reduction method – as it is applied today – actually fails to "retain the underlying [rate] relationships," as the ICC and Board intend it to. In section III.H.2.b.(1), below, Professor Kalt explains how cross-over traffic introduces this distortion, and he suggests an approach to eliminating that distortion.

As an alternative to the Board's well-established percent reduction method, WFA/Basin in this proceeding propose a novel approach to establishing an issue traffic rate if SARR revenues are found to exceed SAC. This method is referred to as the Revenue Allocation Method ("RAM") by the complainants. As explained in section III.H.2.b.(2), below, this approach is flawed in concept and is inconsistent with the economic principles that led the ICC to adopt CMP and the stand-alone cost test in the first instance.

As a "fallback," WFA/Basin propose a second methodology, the Reduced Mark-Up method, although WFA/Basin's opening evidence contains only a few sentences about this methodology. As explained in section III.H.2.b.(3), this approach is also fundamentally flawed – and the complainants' evidence gives it such short shrift that it seems they do not seriously stand behind it. If the Board in this proceeding determines not to accept the contestability approach to establishing the revenues the SARR can earn on cross-over traffic that follows directly from the principles of CMP under the *Guidelines* (with its added benefit of rendering moot the need for a revenue reduction methodology), it should employ the percent reduction approach with the modification, described below in section III.H.2.b.(1), required to eliminate the distortion caused by extensive use of cross-over traffic.

(1) The Percent Reduction Method

(a) Cross-Over Traffic Distorts Application of the Percent Reduction Method

In the marketplace, shippers and railroads make decisions on transportation rates based on the through movement of traffic between each movement's ultimate origin and its ultimate destination. It is the through rate relationships that are observed in the marketplace, and not some formulaic revenue allocations at arbitrary splits in a through movement, that the ICC intended to preserve when it adopted the percent reduction method in *Coal Trading*. The introduction of significant volumes of cross-over traffic into the SAC calculations, however, and the way in which the percent reduction has been applied in those circumstances have introduced a distortion that thwarts the very purpose of the percent reduction methodology. The preexisting rate structure is no longer preserved. Instead, the through rates on issue traffic (and other local traffic, if any) are reduced by a higher percentage than the *through* rates on the cross-over traffic.

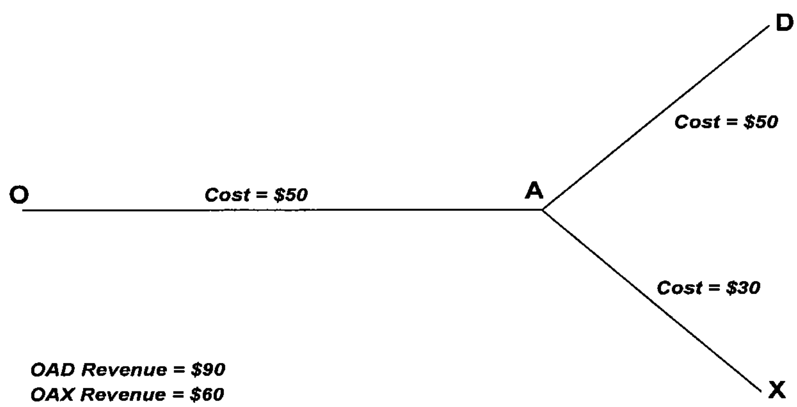
A simple example illustrates this point. Consider a network with three shippers – one that is local to the SARR, and two cross-over moves. Assume that the Board found that hypothetical stand-alone revenues exceed stand-alone costs by 20%, and it has applied the percent reduction method to reduce rates on this SARR with significant cross-over traffic.

Table III.H-2
Example of Percent Reduction Applied to Three Shipper SARR

	Revenues Before 20% Reduction			Revenues After 20% Reduction		
	SARR Revenue	Residual Incumbent Revenue	Total Revenue	SARR Revenues	Total Revenues	Percent Reduction on Through Rate
Local Movement	$100	$0	$100	$80	$80	20%
Cross-Over Move #1	$50	$50	$100	$40	$90	10%
Cross-Over Move #2	$10	$90	$100	$8	$98	2%

The rate for the local movement would be reduced by 20% since all of its revenue is captured by the SARR. But for cross-over moves, the lower the mileage of the movement over the SARR is, the smaller the allocation of revenue to the SARR under MSP is, and the lower the *overall* rate reduction on the movement is. In the example, the movement with only $10 of revenue allocated to the SARR has its *through* rate reduced by only 2%, as compared to the movement with $50 of revenue allocated to the SARR, which has its *through* rate reduced by 10%. (Note that for both movements, the rate reductions are less than the hypothetical prescribed 20% reduction.) The through rates of the two cross-over movements, equal before the rate reduction, are no longer the same after the rate reduction. In short, the current percent reduction approach applied to SARRs that include cross-over traffic destroys the rate relationships that can be observed in the market, rather than preserving them as the Board (and the ICC before it) previously stated is the intention.

To minimize the distortion to preexisting rate structures when cross-over traffic is involved, the percentage reduction should be calculated using the entire through rate rather than just the SARR's portion of the through rate. Consider the following hypothetical example of a simple rail network to clarify BNSF's proposed modification to percent reduction.



Traffic moving from O to D is the issue traffic; the incumbent consists of OA, AD, and AX; and the SARR proposes to build and market itself as the replacement for OAD. That is, if successful in the contestable market, the SARR replaces the incumbent on sections OA and AD. The issue traffic on OD shares line segment OA with another movement from O to X. The SARR is treated here as moving the non-issue OX traffic as cross-over traffic, handling it from O to A, at which point it is interlined with the residual incumbent for movement to X.

Assume that the issue traffic on OAD generates revenues of $90 at existing rates, while OAX traffic (a segment of which is going to become cross-over traffic if the SARR successfully competes only for non-issue traffic as cross-over traffic) generates *through* revenue of $60 at existing rates. Suppose, in addition, that MSP allocates $40 of the $60 of through revenue from the cross-over traffic to the SARR, leaving the residual incumbent with an allocation of $20 of revenue for its portion of the cross-over traffic. Finally, assume that costs of operating the OA and AD segments are each \$50, and the operating costs of the AX segment is \$30. With these assumptions in mind, if the SARR were to replicate the entire system, SAC revenues (\$90 + \$60 = \$150) would exceed SAC costs (\$50 + 50 + \$30 = \$130) by \$20 – implying the need for a rate reduction of 13.3% (\$20/\$150). Correspondingly, the issue traffic rate would be reduced by \$12, from \$90 to \$78, and the OAX rate would be reduced by \$8, from \$60 to \$52, for a total reduction of \$20 – just enough to eliminate the \$20 overcharge. Note, also, that the existing OAD/OAX rate relationship (\$90/\$60 = 1.5) remains after application of the percent reduction (\$78/\$52 = 1.5).

On the other hand, if the SARR is constructed to rely on cross-over traffic by building only the OAD segment, then revenues would be \$130 (\$90 + \$40), and stand-alone costs would be \$100 (\$50 + \$50). Under the current approach to applying the percent reduction method, the overall reduction is calculated by dividing the overage (\$30, in this case) by the total revenues earned by the OAD SARR (\$130 in this case), to yield a rate reduction of 23.1% (\$30/\$130). Under these circumstances, the issue traffic rate is reduced by \$20.77, from \$90 to \$69.23, and the SARR portion of the OAX rate is reduced by \$9.23, from \$40 to \$30.77. This is a combined reduction of \$30, sufficient to just offset the \$30 overage, but note that the issue traffic rate has declined by 23.1%, while the OAX through rate of \$60 has declined by only 15.4% (\$9.23/\$60). Because the percent reduction varies with the portion of the traffic that is moved over the SARR, the OAD/OAX rate relationship falls from 1.5 (\$90/\$60) to 1.36 (\$69.23/\$50.77). Thus, when cross-over traffic is involved and the percent reduction is calculated by including in the denominator only the SARR portion of revenues for cross-over traffic movements, the existing rate relationships are destroyed.

In short, if MSP allocates too little revenue to cover the costs of the residual incumbent (here, the AX segment), and too much revenue to the cross-over segment (here, the OA segment), the percent reduction calculation is distortive. Note, also, that if the MSP acted in the opposite way by allocating revenue to the residual incumbent that exceeds the residual incumbent's costs, i.e., by allocating only \$20 to the OA segment and \$40 to the AX segment, the SAC proponent would have the incentive to expand its network by building the AX segment. Even under the arbitrary MSP revenue allocation approach it would obtain \$40 in additional revenue and incur only \$30 in excess costs, thereby increasing both the total overcharge and the overall level of the rate reduction. This fact is important, as discussed below.

(i) <u>BNSF's Recommended Modification of the Percent Reduction Method in the Presence of Cross-Over Traffic</u>

BNSF contends that when cross-over traffic is involved, the percent reduction approach, if it is used, should be calculated by dividing the overage of SAC revenues minus SAC costs by the sum of the *through* revenues for *both* local and cross-over traffic, *not* by the SARR revenues, which include only the SARR's portion of the through revenues on each cross-over movement. In our example, this would require dividing the alleged overcharge (\$30) by the total through revenues (\$150), for a percent reduction of 20%. This would reduce the issue traffic rate by \$18, from \$90 to \$72, and it would reduce the through rate on the OAX movement from \$60 to \$48, for a total reduction of \$30 – sufficient to entirely offset the \$30 overage that was calculated. But under BNSF's approach, the rate relationship that existed prior to the revenue reduction (\$90/\$60 = 1.5) remains after the rate reduction (\$72/\$48 = 1.5).

Note that BNSF's recommendation does not completely eliminate the distortion in the SAC result caused by permitting the use of cross-over traffic because the \$30 overage calculated on the basis of the cross-over traffic scenario overstates the \$20 overage that truly exists in the full SARR, *i.e.,* the numerator in the percent reduction calculation is overstated. Nevertheless, it does reduce the overall level of distortion by forcing the denominator in the percent reduction calculation to conform to the denominator that would exist if the full SARR were built. In the example, the modification to the percent reduction proposed by BNSF results in an issue traffic rate reduction of $18, which is still higher than the $12 that would result if the full SARR were built; but it is lower than the $20.77 reduction in issue traffic revenues that results by applying the current percent reduction approach.

As the following table demonstrates, BNSF's modified percent reduction reduces the distortion in rate prescription as long as the MSP attributes revenues to the residual incumbent's operations (the AX segment) that are less than the incremental costs of that segment. It entirely eliminates the distortion when the revenues allocated to the residual incumbent's operation exactly equal the incremental costs.

Table III.H-3
Comparison of Percent Reduction Methodologies

	Percentage Reduction		
Amount Allocated to Residual Incumbent AX Segment	Full SARR	OAD SARR Using Traditional Percent Reduction	OAD SARR Using Modified Percent Reduction
$10	13.3%	28.6%	26.7%
$15	13.3%	25.9%	23.3%
$20	13.3%	23.1%	20.0%
$25	13.3%	20.0%	16.7%
$30	13.3%	16.7%	13.3%

Returning to the example, the percent reduction calculated when the SARR is built out to cover the full network of the incumbent is the amount by which the SAC revenues exceed SAC costs ($20), divided by *through* revenues on movements of both issue traffic and cross-over traffic ($150). This would reduce rates by 13.3% ($20/$150). Rates on the issue traffic would be reduced by $12 from $90 to $78. Rates on cross-over traffic would be reduced $8 from $60 to $52. Consistent with the Board's stated goal of preserving relative rate relationships, the structure of rates is preserved ($78/$52 = 1.5, the same relative relationship as $90/$60). Furthermore, the total reduction in revenues is equal to the total SAC overcharge of $20 ($12 + $8). The overall system is able to just cover its costs.

(ii) <u>The Underlying Economic Basis for BNSF's Proposed Modification</u>

The modification to the percent reduction method that BNSF contends is required to minimize the distortion caused by relying on cross-over traffic while conforming to the ICC/STB goal of maintaining existing rate relationships is economically logical. Specifically, preservation of rate relationships requires that the same percentage rate reduction, if any is needed, be applied to all *through* rates – issue traffic, non-issue through traffic, and the combined portions of fragmented cross-over traffic that constitute the rate for through movements of such traffic. By contrast, in the presence of significant volumes of cross-over traffic, the way the percent reduction is currently applied substantially distorts the existing rate relationships.

The complainants might respond that the assumption implicit in the current approach is that the percent reduction that is calculated really applies to the *through* revenues paid by cross-over traffic, not just the SARR portion of those revenues. In our example above, in other words, the argument would be that the 23.1% reduction really applies to the $60 through revenue for the OAX move, not just the $40 of OAX revenue that is attributed to the SARR. But that would increase the overall reduction above the $30 overage calculated for the SARR, to $34.62. This would be reasonable only if MSP allocated revenues to the residual incumbent (here, the AX segment) that exceeded the incremental, avoidable cost of operating that segment.

We know that is not the case in our example. The $20 allocated to the AX segment is actually $10 below the $30 cost to operate the segment, which is why the overage for the full SARR is only $20, while the overage for the OAD SARR is calculated as $30. But it is reasonable for the Board to presume that this is true more generally for cross-over traffic because, as noted above, proponents of a particular SARR configuration would have a powerful incentive to build out the equivalent of the AX segment if incremental revenues from building out the segment exceeded the cost of doing so. If they choose not to, it is generous to presume that incremental revenues from expanding the system would just equal the incremental costs of doing so – which would mean that the "overage" calculated for the SARR portion of a cross-over traffic movement is also the "overage" associated with the through rate. And we demonstrate in the above table that under those circumstances, the modification to the percent reduction advocated by BNSF, when cross-over traffic is present, would generate a rate reduction for the issue traffic identical to the rate reduction created by building the full SARR, thereby eliminating this distortion.

Given the choice of the SARR by the complainants and the Board's finding of an overcharge in revenue, the modified percent reduction methodology set out here preserves the relationship between rates while reducing the total overcharge by an amount that is consistent with the reduction necessary to bring revenues in line with cost – *without* making an irrational assumption that there are additional "overcharges" that the complainants could have taken into account if they had only built a larger SARR.

(b) Purported Railroad Gaming

The complainants claim that "gaming" by the railroads makes the common carrier tariffs issued by the railroads an unreliable starting point for the Board's rate-setting exercise.[7] Railroads, the shippers claim, can determine the outcome of the process by setting the starting rates arbitrarily high, and application of the calculated percentage reduction to a railroad's challenged rates is asserted to be "an open regulatory invitation from the Board to the railroad industry to set whatever rates the industry wants."[8] The claim that BNSF has set arbitrarily high rates ignores that fact that the challenged tariff rates set by BNSF are not set arbitrarily; they are commercially reasonable rates that were set with regard to marketplace conditions.

As Professor Kalt discussed in his opening testimony and is further discussed in the Verified Statement of BNSF witness Robert Brautovich, rates prior to the challenged increase had been set pursuant to a 1984 legal settlement that left rates below and insulated from market-determined rate levels. Moreover, the demand for coal and the concomitant demand for coal transportation have been particularly strong recently, and (as Professor Kalt explained) rising demand relative to supply of coal transportation services should be expected to put upward pressure on rail rates in a well-functioning marketplace. In addition, BNSF concluded that the demand-based rates that it could charge for the movement of coal from the PRB to Laramie River Station were substantially higher than the expiring contract rate.[9] This is an indication that, given the overall constraints of the SAC analysis, the rates are a reasonable starting point for a revenue-inadequate railroad such as BNSF.

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[7] WFA/Basin Opening Nar. at III-H-10 to 13.

[8] WFA/Basin Opening Nar. at III-H-12.

[9] *See* Verified Statement of Robert A. Brautovich (BNSF Reply Exh. III.A-5), at 2-5.

As is discussed above and shown in BNSF Reply Exhibit III.A-3, the evidence in this case is that the complainants' finding of a reduction in rates is being driven not by purported railroad gaming, but by complainant gaming. The complainants, by their selection of cross-over traffic and their application of revenue allocation rules, are taking advantage of rules that generously over-allocated revenue to cross-over traffic. The implication of the complainants' choices, as is shown in Exhibit III.A-3, is that the entirety of the SARR is paid for by cross-over traffic. Indeed, even when rates for the issue traffic are reduced to zero, the complainants would calculate that a rate reduction is required. This is clearly not the result of purported railroad gaming.

(c) <u>Results of Implementing BNSF's Modified Percent Reduction Methodology</u>

For illustrative purposes, BNSF witness Baranowski has calculated the implied percent reduction using the method that the Board has applied in previous cases and compared this to the reduction generated using BNSF's proposed modification, which is needed to preserve relative rate relationships. The calculation shows that, using WFA's opening evidence modified to correct the issue traffic revenue, under the current Board methodology the percent reduction to the issue traffic rate is 42%. Using the same cost and revenue allocation assumptions, but changing the percent reduction method to use *through* traffic revenues as the basis for reducing rates, the implied reduction on the issue traffic falls to approximately 7%.[10] This large difference demonstrates the very significant impact that getting the rules "right" (or at least consistent with stated policy objectives) on cross-over rates and revenue allocations has on outcomes under SAC tests.

[10] *See* BNSF reply electronic workpaper "Exhibit_III-H-1R Through Revs.xls."

(2) The Complainants' Proposed Rate Reduction Methodology: Revenue Allocation Method

Citing purported defects in the percent reduction method with regard to the possibility of railroad "gaming," the complainants propose an alternative method for determining the adjusted rates: the Revenue Allocation Method, or "RAM." RAM allocates joint and common SAC costs (that is, SAC costs above the asserted variable cost of each movement) across different groups of traffic based on methods that the complainants claim are consistent with Ramsey pricing. After dividing the SARR traffic's shippers into two groupings ("competitive" and "captive"), the complainants assume that the price elasticities of demand are identical within each group of shippers.[11] In setting the rates, the "competitive" group pays only its variable cost, making no contribution at all to joint and common costs. All of the joint and common costs are allocated – on the basis of ton-miles – to the shippers in the "captive" group. The rates for each movement under this method are the sum of the movement's variable costs and its allocated share of joint and common costs.[12]

Notwithstanding assertions of the complainants, the resulting RAM rates are sharply at odds with Ramsey pricing principles. Let us see why.

(a) Ton-Miles Are an Arbitrary Mechanism for Allocating Joint and Common Costs to Individual Movements

An inherent problem with the RAM approach is that within the group of "captive" traffic, the complainants have employed ton-miles as the basis for "allocating" a contribution (SARR revenue requirement minus "variable costs," or joint and common costs) requirement to each of

[11] To the extent that any of the shippers are incorrectly classified in the captive group, this would decrease the allocation to the issue traffic by spreading joint and common costs over a larger group of shippers. The RAM method can be quite sensitive to how shippers are classified.

[12] Subject to an imposed constraint on the allocation of joint and common costs to ensure that the rate assigned to each plant does not exceed its actual rate.

the shippers. This method of allocating joint and common costs is inherently arbitrary because it does not recognize that demand elasticities vary across plants. In a number of prior rulings, the Board has rejected allocating costs on the basis of ton-miles.[13] Unless all of the members of this group of utility plants have identical demand characteristics, this approach does not allow for demand-based differential pricing. As recognized in the *Guidelines,* "non-demand-based cost apportionment methods do not necessarily reflect the carrier's ability (or inability) to impose the assigned allocations and cover its costs."[14] When elasticities vary among a group of plants, if a railroad attempted to collect a rate that was based on an average contribution amount per ton-mile across all plants, some of the traffic of the more price-sensitive shippers would shift to other options, thus leading to under-collection of revenues that would have to be made up from other customers.

In fact, the only reason that RAM and the ton-mile allocation of contribution can be implemented is because the complainants are willing to assume that traffic falls into two groupings: one which bears no allocation of contribution and one which bears all of the contribution, allocated proportionally to ton-miles. Under this approach, the shippers responsible for joint and common costs each contribute exactly the same amount per ton-mile to cover those costs. To the extent, as discussed in the next section, that the captive group cannot be treated as a monolith with equal elasticities or that the competitive shippers should bear some (however small) portion of contribution, the ton-mile allocation cannot be used as the basis for allocating contribution and thus determining prices. And without this assumption, RAM falls apart.

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13 *Coal Trading* at ¶39-40; CP*&L/NS* at 33.

14 *Coal Rate Guidelines* at 526.

(b) Bifurcated Allocation of Shippers Does Not Reflect Economic Differences in Shippers

At the foundation of WFA's bifurcation of shippers into "captive" and "competitive" groups is the assumption that all the shippers within each grouping have equal demand elasticities. Beyond classifying traffic into two broad groups, the complainants have not provided any evidence to support the assumption that the elasticity of demand is identical across all of the shippers in either the "competitive" or the "captive" grouping.

In the *Guidelines*, the ICC recognized that joint and common costs must be recovered from individual movements using the principles of differential pricing. Ramsey prices include a mark-up above the long-run marginal cost to cover joint and common costs in inverse proportion to each shipper's demand elasticity. That is, shippers who are very sensitive to changes in prices (high elasticity) will pay prices that are relatively close to the marginal costs of serving them, while shippers whose demands are less sensitive to price changes (low elasticity) will pay prices much higher than their marginal costs. With Ramsey pricing, the mark-ups over long-run marginal cost for each shipper sum up to the total joint and common cost. Moreover, Ramsey pricing requires every movement with demand elasticity which is not infinite – that is, realistically, every movement – to make some contribution above long-run marginal costs to the joint and common costs of the SARR network. WFA's RAM approach is entirely inconsistent with Ramsey pricing, since it requires only the "captive" shippers to help defer joint and common costs.

While the ICC recognized that Ramsey pricing is a useful theoretical guideline, it also recognized that the data requirements (for example, movement-specific marginal costs and elasticities of demand) are too burdensome for universal application.[15] The Board has, instead,

[15] *Coal Rate Guidelines* at 527.

indicated that it will consider qualitative evidence on relative demand elasticities in implementing CMP, concluding: "We are satisfied that the constraints and incentives CMP contains should lead to rates approximating Ramsey prices."[16] However, WFA/Basin do not present qualitative (or quantitative) evidence on differences across shippers. Instead, the complainants justify the assumption of equal elasticity for all plants based on the simple-minded point that all of the utility plants in the "captive" group use BNSF-supplied PRB coal and are solely served by BNSF at either the origin or the destination.[17]

This description vastly oversimplifies the complexities of electric generation. Individual utilities have their own set of reasonable alternatives available to them for meeting the demands of their customers, and the presence of these alternatives affects how elastic the demand of any particular utility is. A railroad could find itself facing multiple sources of "product" or "geographic" competition on the margin. Sources such as other fuels, a utility's other plants, or a utility's ability to buy power from others on the electricity grid all provide a source of competition to railroad-delivered coal to a particular plant. Such factors affect a plant's elasticity of demand for coal transportation, and they can vary substantially from plant to plant and buyer to buyer. Similarly, some power facilities have the ability to burn other types of fuel in addition to or as a substitute at the margin for rail-transported coal, and power producers can hold a portfolio of plants, giving them the ability to substitute power from different plants, either within the same utility or from other plants that are connected to the grid, to serve their customers' needs.

To the extent that a utility has an ability to switch between sources of fuel and/or sources of power within its portfolio, it can use this competitive discipline vis-à-vis the railroad(s) from

[16] *Coal Rate Guidelines* at 527.

[17] WFA/Basin Opening Nar. at III-H-23, III-H-25 to 28.

which it gets service. For example, a utility may negotiate a deal with a railroad where rates at a solely-served plant are linked to rates at a competitively-served plant. Another buyer may not have this ability or option. The ability to switch fuels, or to acquire power needed to meet the demand of its customers by purchasing electricity in the wholesale market or by acquiring power at another plant owned by the same utility, provides alternatives that make a shipper more sensitive to increases in the cost of rail transportation. The amount of flexibility a utility has to swing toward or away from the coal-fired plant to meet its needs affects its elasticity.

Qualitatively, Laramie River Station has attributes that are likely to make its demand for PRB coal relatively inelastic compared to other shippers in the complainants' "captive" group. These characteristics include its proximity to the Powder River Basin, its low cost of production,[18] and its lack of access to alternative fuels. Relatively inelastic demand implies relatively higher rates under Ramsey principles. Mr. Brautovich's discussion of BNSF's relationship with Laramie River Station bears out these implications.

In summary, the complainants have presented differences across plants in only the most rudimentary way. Moreover, as discussed above, their approach is dependant on notably unrealistic assumptions. The RAM approach presented by the complainants fails as a simplified surrogate for Ramsey pricing.

(3) The Complainants' "Fallback" Rate Reduction Methodology (Reduced Mark-Up Method)

As an apparent "fallback" to RAM, the complainants present an alternative method for adjusting rates, claiming that it demonstrates that RAM results are reasonable. However, this Reduced Mark-Up Method is based on an unsound analytical framework and cannot be relied on.

[18] See BNSF Opening Nar. at II-27 to 28 and BNSF Opening Exhs. II.C-2 and II.C-3.

As an initial matter, the glaring conceptual differences between the Reduced Mark-Up Method and RAM underscore the lack of any principled basis for the complainants' proposals on this issue. Under RAM, as noted above, all of the SARR traffic movements are organized into one of two groups – "competitive" traffic, which is assumed to be so demand-elastic that it cannot afford to pay *any* of the SARR's joint and common costs, and "captive" traffic, movements which are assumed to have identical elasticities of demand that enable them to pay whatever portion of the SARR's joint and common costs are allocated to them. In contrast, the Reduced Mark-Up Method assumes that there is a wide spectrum of demand elasticities for the SARR traffic movements – as indicated by the wide range of revenue-to-variable cost relationships WFA/Basin calculate – and that each movement is capable of providing some contribution to the SARR's joint and common costs. Both of these approaches cannot be right, yet WFA/Basin seeks to imply that they are somehow conceptually consistent.

The single most glaring flaw in the Reduced Mark-Up Method is its assumption that the one can infer relative demand elasticities for each cross-over traffic movement by comparing the portions of the through revenues allocated to the SARR using MSP for each movement to the "variable costs" calculated by WFA/Basin for only the cross-over portion of each movement. As noted earlier, a shipper's decision to move freight at a particular price is a function of the alternatives it has to move traffic from ultimate origin to ultimate destination. These elasticities of demand can only be evaluated by comparing the revenues the shipper pays for end-to-end transportation (not the revenue allocated to a portion of an end-to-end movement using a formula that entirely ignores demand) to BNSF's long-run marginal costs of handling that movement end-to-end.

WFA/Basin's Reduced Mark-Up Method does not perform these calculations based on through rates, and it therefore cannot reliably measure, or even "ball park," the relative demand elasticity for any of the movements in the SARR traffic group.[19] Without this capability, the Reduced Mark-Up Method is not meaningful, and certainly cannot be presumed to be consistent with Ramsey pricing principles. The prices upon which customers' demand decisions are based are necessarily through rates, yet the revenue for the SARR portion of each cross-over traffic movement is determined by the MSP revenue allocation, which does not and cannot reflect relative demand.[20]

Similarly, the "variable cost" calculations relied upon by WFA to implement the Reduced Mark-Up approach are not sufficiently precise to be meaningful. If reliable demand elasticities could be inferred by reference to a one- or two-quarter snapshot of existing rate levels, and comparison to the sort of "SARR system average" variable costs that WFA proposes here, nothing would have prevented the Board (or the ICC before it) from calculating demand

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[19] In addition, there are flaws in WFA/Basin's cost calculations. Most importantly, they do not rely upon BNSF costs, but on WFA/Basin's efforts to force its SAC calculations into something akin to a LRR URCS cost. Since BNSF set its rates with reference to its own costs, not some hypothetical costs for the LRR developed for litigation, it is unlikely that ratios of revenues to the LRR costs that WFA/Basin have developed indicate anything about demand elasticities, even if the SARR were expanded to include the full BNSF route for every cross-over traffic movement.

[20] An easy way to illustrate this problem is to consider what would have happened to "demand elasticities" implicit in the Reduced Mark-Up Method when the STB shifted from the modified mileage prorate, which was previously used to allocate through revenues to the SARR portions of cross-over movements, to the MSP. Because the change to MSP generally reduced the revenues assigned to cross-over traffic, particularly on cross-over traffic that moved for only a short distance on the SARR, while costs would remain unchanged, this change had the effect of reducing the revenue-to-variable cost ratios on many cross-over traffic movements. The Reduced Mark-Up Method – which looks at only the SARR revenues and costs – would conclude that these movements had suddenly become more demand elastic (because they would exhibit lower revenue-to-cost ratios) even though the revenue cost ratios for the through movement – the only rates actually negotiated in the market – would remain completely unchanged.

elasticities and implementing Ramsey pricing long ago. But as the Board and the ICC have consistently recognized, average variable cost calculations and short-term rate levels are not sufficiently precise to generate reliable long-run estimates of demand elasticity. As a result, the reliability of WFA/Basin's Reduced Mark-Up approach – even if it were based on through revenues and costs – would have to be rejected for all of the reasons the Board originally rejected direct calculation of Ramsey prices in favor of CMP and the stand-alone cost test.

3. Rate Prescription

The results of BNSF's SAC analysis demonstrate that no rate prescription should be necessary. Should the Board conclude that SARR revenues exceed SARR costs, however, it should decline WFA/Basin's invitation to prescribe a single "average" rate for all mine origins. *See* WFA/Basin Opening Nar. at III-H-36. As the verified statement of Robert A. Brautovich attached as Exhibit III.A-5 demonstrates, BNSF had good reason to establish different rates depending upon mine origin. As Mr. Brautovich testifies, BNSF established its rates for commercial reasons, including the fact that traffic from the northern mines must traverse the entire already highly congested Orin Line, contributing to that congestion and causing operational difficulties. Moreover, because Laramie River is located close to the PRB, the distance between mines materially affects the overall length of haul. A move from the Dry Fork mine in the north, for example, is more than 50% longer than a move from the Antelope mine in the south.[21] Not surprisingly, the cost of transporting coal to Laramie River also varies depending on mine origin. Indeed, WFA/Basin's own calculations confirm that costs differ significantly depending on mine origin, with their allocation of stand-alone costs for northern

[21] *See* WFA/Basin opening electronic workpaper "LRS RAM Rates_4Q 2004-2024.xls," worksheet "1Q 2005," cells F15 and F16 (showing 112 miles vs. 186 miles).

mines under the RAM method exceeding that for southern mines by \$1.48 per ton.[22] Given these circumstances, WFA/Basin have failed to suggest any justification for prescribing a single rate instead of three different rates based on mine origin.

WFA/Basin's request for a single rate is nothing more than an effort to create a lower overall rate that is distorted by the weight assigned to southern PRB origins. The "average" rate that WFA/Basin calculate beginning with the first quarter of 2005 is not based on historical shipping patterns to the Laramie River plant, but instead assumes that nearly { }% of the coal delivered to Laramie River will be sourced from southern PRB mines.[23] Historically, as WFA/Basin themselves admit, WFA/Basin have obtained "most LRS coal deliveries from mine origins BNSF has designated as Central and North." WFA/Basin Opening Nar. at III-A-12. This pattern persisted for actual shipments during the first quarter of 2005, {

}[24] In other words, even when actual shipments showed that WFA/Basin were continuing to source their coal from northern and central mines, WFA/Basin assumed for purposes of calculating SAC rates that nearly { }% of those shipments were coming from southern mines, and that the new pattern would hold from the first quarter of 2005 through the remainder of the DCF period.

WFA/Basin's manipulation of mine origins permits WFA/Basin to calculate a much lower "average" SAC rate than would have been the case had WFA/Basin used only the central and northern mines { } in their calculations. The difference is

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[22] WFA/Basin opening electronic workpaper "LRS RAM Rates_4Q 2004-2024.xls," worksheet "1Q 2005," cells N15 and N16. *See also*, WFA/Basin Opening Nar. at III-H-35 (showing different jurisdictional thresholds by mine).

[23] WFA/Basin opening electronic workpaper "LRS RAM Rates_4Q 2004-2024.xls," worksheet "1Q 2005," cell I15.

[24] *See* WFA/Basin opening electronic workpaper "WFA OPEN REPARATIONS RAM.123," cells D145 to D260.

obvious from a comparison of the average SAC rate WFA/Basin calculates for the fourth quarter of 2004 (where only central and northern mine origins were used) to the average first quarter 2005 SAC rate (calculated using southern mine origins): the first quarter 2005 average rate is $0.47 less than the fourth quarter 2004 rate.[25] As the following table derived from WFA/Basin's electronic workpapers[26] shows, the variation is due primarily to inclusion of lower-rate southern mine traffic, not to changes in rates for given mines from quarter to quarter.

Table III.H-4
WFA/Basin Calculation of Maximum SAC Rates by Mine

Mine Group	**Mine**	**4Q2004**	**1Q2005**	**% Change**
Northern	Dry Fork	$3.73	$3.72	-0.2%
	Eagle Butte	$3.77		
Central	Caballo		$3.32	
	Caballo Rojo	$3.19	$3.21	0.8%
	Cordero	$3.08		
Southern	Antelope		$2.24	
WFA/Basin Average Rate		**$3.38**	**$2.91**	**-13.7%**

If the Board were to accept the "average" rate calculated by WFA/Basin, WFA Basin would be free to continue to source its coal from northern and central mines while paying a maximum SAC rate that is largely based on an assumption that coal will originate from southern

[25] *Compare* WFA/Basin opening electronic workpaper "LRS RAM Rates_4Q 2004-2024.xls," worksheet "4Q 2004," cell N19 *with* worksheet "1Q 2005," cell N19.

[26] *See* WFA/Basin opening electronic workpaper "LRS RAM Rates_4Q 2004-2024.xls," worksheets "4Q 2004" and "1Q 2005."

mines. If the Board determines that a rate prescription is necessary, it should prescribe three rates so that WFA/Basin will not be able to engage in such abusive practices.

4. Reparations

BNSF's evidence shows that no reparations are called for. Even if reparations were appropriate, however, the Board could not follow the "average" rate approach to calculating reparations advocated by WFA/Basin. The discussion above demonstrates that WFA/Basin's calculation of a single "average" rate distorts the maximum rate analysis by giving improper weight to lower-rate southern mines { }. This defect carries over into WFA/Basin's reparation calculations for the first quarter of 2005. WFA/Basin calculate the reparations supposedly owed by subtracting the "average" maximum SAC rate from the rate that WFA/Basin was charged per ton for each movement.[27] This difference is then multiplied by the tons for each movement to calculate an overcharge that is supposedly owed to WFA/Basin. As noted above, however, the "average" rate has been artificially lowered by including fictitious southern mine traffic. To calculate first quarter 2005 reparations, WFA/Basin use this lower "average" rate, which assumes that nearly { }% of the shipments originated from a Southern mine, even though { } The net result is that WFA/Basin substantially overstates its reparations.

[27] *See* WFA/Basin opening electronic workpaper "WFA OPEN REPARATIONS RAM.123," column P.

IV. WITNESS VERIFICATIONS

1. Gerald G. Albin

Gerald G. Albin is a Principal and Vice President of TranSystems Corporation, a civil engineering company located in Denver, Colorado. His business address is 4949 S. Syracuse, Suite 620, Denver, CO 80237. Mr. Albin is a registered professional civil engineer in five states including Wyoming, Montana and Minnesota. He has been involved in railroad engineering since 1962. He has had more than thirty years experience working for BNSF and its predecessors. Between 1970 and 1980, he held the positions of Assistant Maintenance Engineer, Regional Engineer, and Maintenance Engineer for The Burlington Northern Railroad Company ("BN") (predecessor to BNSF). From 1980 to 1988, he held various staff positions (Director & Assistant Director of Maintenance planning) in St. Paul and Kansas City, as well as working for four years as Chief Engineer of the BN Springfield Region. From 1988 to 1995, he held the positions of Director of Engineering, Chief Engineer of Field Operations, Superintendent of Roadway Engineering, and Assistant Chief Engineer of Design/Construction for the Southern Region of BN, including much of the route of the proposed stand-alone railroad in this case – *i.e.*, Wyoming, Montana and Minnesota. His responsibilities included project management, design and construction of rail lines, including numerous projects on the lines involved in this proceeding. In addition, he has had responsibility for the supervision of construction, design and maintenance activities in various departments, including track, bridge, signal and telecommunications.

Mr. Albin is sponsoring evidence relating to random failures in railroad operations in Section III.C.2 and maintenance-of-way costs set forth in Section III.D.4. Mr. Albin has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on July 14, 2005

Gerald G. Albin

2. Michael R. Baranowski

Michael R. Baranowski is a Senior Managing Director at FTI Consulting, Inc., an economic and financial consulting firm. His business address is 1201 Eye Street, N.W., Suite 400, Washington, DC 20005. Since 1980, Mr. Baranowski has been involved in many aspects of transportation consulting including operational analyses, terminal switching studies, facility and equipment valuation, liquidation studies, merger studies as well as a variety of cost studies including the development of both short and long run marginal cost, variable cost and stand-alone costs. He has been responsible for developing costs and working with the Board's discounted cash flow model in stand-alone cost proceedings since 1987 and has sponsored testimony in a number of those proceedings including the *APS*, *Potomac Elec. Power Co. v. CSX Transp., Inc*, *WPL*, *Duke Energy Co. v. CSX Transp. Co.*, *Duke Energy Co. v. Norfolk Southern Ry. Co.*, and *Carolina Power & Light v. Norfolk Southern Ry. Co.* cases.

Mr. Baranowski received his Bachelor of Science in Accounting degree from Fairfield University in 1980. In 1988, he joined Klick, Kent & Allen, Inc. ("KK&A"), which was acquired by FTI Consulting in 1998. While with KK&A and FTI, Mr. Baranowski has conducted a wide range of studies in both the transportation and telecommunications industries and testified in proceedings before the Interstate Commerce Commission, Surface Transportation Board, Federal Communications Commission, and various State Utility Commissions.

Mr. Baranowski is sponsoring evidence relating to the Board's DCF model and SAC calculations contained in Sections III.G and III.H. Mr. Baranowski has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on July 15, 2005

Michael R. Baranowski

Michael R. Baranowski

3. Robert J. Boileau

Robert J. Boileau is Assistant Vice President of Engineering Services for BNSF Railway. Mr. Boileau has been employed by BNSF Railway or its predecessor for more than 27 years. His experience includes ten years of working with structures, four years on maintenance of way, and thirteen years in engineering and construction related activities holding the titles, Division Engineer, Regional Engineer and Director Engineering. Mr. Boileau began his career with BNSF working on the construction of the Orin Line from Reno to Orin in 1978-1979.

Mr. Boileau has systemwide responsibility for overseeing Public Projects, providing engineering support for industrial development projects, working with commuter groups and States on commuter construction projects adding capacity to support passenger programs, and supervising BNSF funded expansion projects both line and marketing (double and triple track, intermodal facilities, etc.).

Mr. Boileau received his Bachelor of Science degree in Civil Engineering from the University of Minnesota in 1977. He earned his Masters of Business Administration from the University of Kansas in 1989. Mr. Boileau has been a member of AREMA since 1982. He is a Member of AREMA Committee #1 Roadway, and currently is serving his third year as a Director on the Board of Directors for AREMA. His term expires in the Fall 2005. Mr. Boileau is a Professional Engineer registered in the states of Minnesota and Kansas.

In BNSF's July 20, 2005 Reply Evidence, Mr. Boileau is sponsoring the Introduction to Section III.F and has provided consultation and oversight for the preparation of the evidence in the various subsections of Section III.F. Mr. Boileau has signed a verification of the truth of statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Introduction to Section III.F and the Reply Road Property Investment Evidence in Section III.F, that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on July 12, 2005

Robert J. Boileau

4. Robert A. Brautovich

Robert A. Brautovich is the Assistant Vice President, Coal Marketing West for BNSF. His business address is 2650 Lou Menk Drive, Fort Worth, Texas 76131-0051. Mr. Brautovich has been with BNSF's Coal Marketing Group since 1992. In his Coal Marketing Group positions, Mr. Brautovich has been responsible for managing specific coal customer accounts and now a geographic territory that includes the account with Western Fuels for the Laramie River Generating Station, which is owned by Basin Electric.

Mr. Brautovich has submitted a verified statement that explains the commercial background to BNSF's setting of the common carrier rates for the issue traffic and why those rates are a responsible response to market forces. His evidence is incorporated in Section III.A.3. Mr. Brautovich has signed a verification of the truth of the statements contained therein. A copy of Mr. Brautovich's verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on July 12, 2005

Robert A. Brautovich

5. Harry W. Bues, III

Harry Bues is a Senior Consultant at FTI Consulting, Inc., an economic and financial consulting firm. His business address is 1201 Eye Street, N.W., Suite 400, Washington, DC 20005. With over forty years of experience working with the railroad industry, Mr. Bues is an expert at railroad regulatory cost analysis, return on investment analysis, cost benefit analysis, acquisitions and valuation services. Mr. Bues has provided expert testimony in over 100 rate and abandonment cases and merger proceedings before the Interstate Commerce Commission, Surface Transportation Board and state regulatory agencies, as well as on arbitration proceedings involving pricing, escalation clauses and operation rights for the major railroads in the United States and Canada.

Prior to joining FTI in 1998, Mr. Bues served as a Principal/Consultant for Klick Kent & Allen, which was acquired by FTI. There he measured costs and revenues for various service levels by segment and the contribution and developed PC-based processes for the allocation of total system expenses. Mr. Bues held senior level positions at Southern Railway Company, Amtrak, and Frank S. Harris & Associates. He served as a consultant for Snavely King & Associates for five years.

Mr. Bues holds a B.S. in Industrial Economics from Purdue University. He completed management programs from the American University and Northwestern University.

Mr. Bues sponsors evidence relating to the fuel consumption of Laramie River trains and the LRR's fuel consumption and costs set forth in Sections II.A.1 and III.D.1. Mr. Bues has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on July 15, 2005

Harry W. Bues, III

6. <u>B. Scott Castleberry</u>

B. Scott Castleberry is BNSF Railway Company's Director, Regulatory Costs. His business address is 2650 Lou Menk Drive, Fort Worth, Texas 76131-2830. Since joining BNSF (then Atchison Topeka and Santa Fe) in 1991, Mr. Castleberry has held a variety of positions including Manager -- Measurement and Profitability Systems, Manager -- Operations Budget, and Senior Manager -- Performance Measurement. Through these positions, Mr. Castleberry has first-hand knowledge and familiarity with many of BNSF's data and performance measurement systems. Mr. Castleberry holds a Bachelor of Science in Industrial Engineering degree from University of Oklahoma and a Master of Science in Management degree from Baker University.

Mr. Castleberry is sponsoring evidence relating to BNSF's fuel consumption data. His evidence is incorporated in Section II.A.1. Mr Castleberry has signed a verification of the truth of the statements contained therein. A copy of Mr. Castleberry's verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on July 19, 2005

Scott Castleberry

7. Rocky M. Elgie

Rocky M. Elgie is Director Fuel Management for BNSF. His business address is 2650 Lou Menk Drive, Fort Worth, Texas 76131-0051. Mr. Elgie has been with the Fuel Management Group at BNSF or its predecessor BN since 1987. In his Fuel Management Group positions, Mr. Elgie has been responsible for managing BNSF's system-wide diesel fuel supply, procurement and logistics. He has negotiated short-term and long-term supply agreements with major oil companies and has negotiated capacity on major pipelines supplying diesel fuel to various BNSF locations. Over the course of his career, Mr. Elgie has developed in-depth knowledge of the North American refined products markets and associated transportation infrastructure, including the specific refineries and pipelines in Wyoming and Montana.

Mr. Elgie is sponsoring evidence relating to the Wyoming and Montana diesel fuel market and pipeline infrastructure and BNSF's fuel sources and costs for traffic included in the stand-alone shipper group. His evidence is incorporated in Section III.D.1 of the Narrative. Mr. Elgie has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on July 15, 2005

Rocky M. Elgie

Rocky M. Elgie

8. <u>Benton V. Fisher</u>

Benton V. Fisher is a Managing Director at FTI Consulting, Inc., an economic and financial consulting firm with offices located at 1201 Eye Street, N.W., Suite 400, Washington, DC, 20005. Since 1991, Mr. Fisher has been involved in various aspects of transportation consulting including economic studies involving costs and revenues, traffic and operating analyses, and work with performance measurement and financial reporting systems.

Mr. Fisher holds a Bachelor of Science in Engineering degree from Princeton University. In 1990, he served as the Deputy Controller for the Bill Bradley for U.S. Senate Campaign. In 1991, he joined Klick, Kent & Allen, Inc., which was acquired by FTI Consulting, Inc. in 1998. While with the firm Mr. Fisher has performed numerous analyses for and assisted in the preparation of expert testimony related to merger applications, rate reasonableness proceedings, contract disputes, and other regulatory costing issues before the Interstate Commerce Commission, Surface Transportation Board, Federal Energy Regulatory Commission, Postal Rate Commission, Federal Court, and State Utility Commissions.

Mr. Fisher is sponsoring evidence relating to BNSF's variable costs for the issue movement as well as evidence relating to coal volumes and revenue and personnel operating expenses for the LRR. His evidence is incorporated in Sections II.A, III.A and III.D.3 of the Narrative. Mr. Fisher has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on July 15, 2005

Benton V. Fisher

Benton V. Fisher

9. Cassie M. Gouger, P.E.

Cassie M. Gouger is a Manager at FTI Consulting, Inc., an economic and financial consulting firm with offices located at 1201 Eye Street, N.W., Suite 400, Washington, DC, 20005. Ms. Gouger is a registered professional civil engineer in the states of Colorado, Illinois, and Wyoming. She has over eleven years experience working on track and yard construction projects for Class 1 railroads, and has assisted in the preparation of engineering testimony on numerous cases before the STB.

Ms. Gouger received a Bachelor of Science Degree in Civil Engineering from Purdue University in 1993, during which she worked for the major national engineering firm of DeLeuw Cather. In 1993 she joined DeLeuw Cather full-time and served as a Construction Inspector of an 18-mile railroad construction project as well as a Design Engineer on railroad capacity improvements. In 1996, Ms Gouger became a Project Manager and Railroad Engineer for TranSystems, Inc. where she designed over 110 miles of new single, double and triple mainline and spur tracks for Class I railroads, including over 20 miles of the Orin Line. She has also assisted in the design of yards and bridges, as well as track upgrading projects. She continued her work as a Transportation Engineer with Felsburg, Holt and Ullevig from 2001 to 2004, where she managed the design team in construction plans, specifications and construction management. She has recently joined FTI where she utilizes her engineering background to provide input for stand-alone cost construction studies.

Ms. Gouger is sponsoring evidence relating to roadbed preparation, track and bridge construction, including signals and communications, public improvements, mobilization, engineering and contingency. She is also sponsoring evidence relating to maintenance of way. Her evidence is incorporated in Sections III.D.4, III.F.2 through III.F.6, and Sections III.F.8

through III.F.12. Ms. Gouger has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

10. Joseph Kalt

Joseph P. Kalt is the Ford Foundation Professor of International Political Economy at the John F. Kennedy School of Government, Harvard University. Mr. Kalt provided testimony in connection with BNSF's opening evidence in this case and his qualifications and CV are set forth in Section IV of that evidence.

Mr. Kalt is sponsoring evidence relating to the application of contestability theory to SAC cases, determination of revenues for cross-over traffic, and approaches to calculating prescribed rate. His evidence is contained in Exhibit III.A-1 and incorporated in Sections III.A and III.H.2. Mr. Kalt has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on July 11, 2005

Joseph P. Kalt

11. John C. Klick

John C. Klick is the Executive Vice President of the economic and financial consulting firm of FTI Consulting, Inc. The firm's offices are located at 1201 Eye Street, N.W., Suite 400, Washington, DC 20005.

Mr. Klick graduated in 1970 from Bates College with a Bachelor of Science degree in Mathematics. He also has taken graduate courses in finance, accounting, and operations research. Since 1970, he has been involved continuously in cost-based economic and financial studies for a variety of industries.

Throughout Mr. Klick's career, he has organized and directed cost and economic studies for service providers, state governments, and other public bodies dealing with railroads, pipelines and other network industries. Examples of past studies that he has participated in include (1) organizing and directing traffic, operational, and cost analyses in connection with the valuation of northeastern rail property transferred to the Consolidated Rail Corporation, (2) calculation of stand-alone and long-run incremental costs for major segments of the nation's railroad industry, (3) estimation of the long-run incremental costs of providing various aspects of local telecommunications services, and (4) calculation of marginal, incremental and stand-alone costs for services performed by a major petroleum products pipeline company. Virtually all of these studies have involved the development and/or use of complex, computerized cost models that make extensive use of detailed engineering and operating input and incorporate sophisticated discounted cash flow techniques.

In addition, Mr. Klick has undertaken studies related to economic issues and analysis such as the effects of productivity and inflation on the costs of operations, forecasts of traffic volumes and corresponding resource requirements, and valuations of services and facilities.

The results of these studies frequently have been presented in both oral and written testimony before the Surface Transportation Board (and its predecessor, the Interstate Commerce Commission), the Federal Energy Regulatory Commission, state public utility commissions, arbitration panels, and the federal and state courts. This testimony has related to subjects such as the development of variable cost of service, marginal costs, incremental costs, stand-alone costs, economic principles related to the maximum and minimum level of rates, and procedures for implementing these maximum and minimum rate principles.

Mr. Klick is sponsoring evidence regarding flaws in volume and revenue assumptions, cross-over revenue divisions methodologies and revenue forecasts. He also sponsors evidence regarding BNSF's modified volume and revenue assumptions. That evidence is incorporated in Section III.A of the Narrative. Mr. Klick has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on July 15, 2005

John C. Klick

12. <u>J. Reilly McCarren</u>

J. Reilly McCarren is a railroad executive and engineer. His business address is 330 Abbotsford Road Kenilworth, Illinois 60043-1105. Mr. McCarren holds Bachelors and Masters Degrees in Civil Engineering from the Massachusetts Institute of Technology. Mr. McCarren is currently the Chairman of the Arkansas & Missouri Railroad Company ("A&M"), a transportation company that provides local railroad, trucking and logistics services in Northwest Arkansas and Southwest Missouri. Prior to his chairmanship at A&M, Mr. McCarren served as an executive at several railroads, including a term as President and Chief Executive Officer of the Wisconsin Central System, the largest integrated regional rail carrier in North America, with a 2,800 mile network in both the United States and Canada, and as President of the Gateway Western Railway and the Wheeling and Lake Erie Railway.

Mr. McCarren is sponsoring evidence relating to G & A. His evidence is contained in Section III.D.3.c. of the Narrative. Mr. McCarren has signed a verification of the truth of the statements contained therein. A copy of Mr. McCarren's verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on July 11, 2005

J. Reilly McCarren

13. Loren E. Mueller

Loren E. Mueller is a railroad transportation consultant. His business address is 614 Regency Crossing, Southlake, TX 76092. Mr. Mueller was employed by BNSF and its predecessors for 32 years. His management positions with the Burlington Northern Railroad began in 1975 as yardmaster at Lincoln, Nebraska. He held a number of positions with the railroad. From 1992 to 1994, Mr. Mueller was General Manager - Coal Operations, responsible for operations of the BN system coal business unit. During this time, he directed major construction and expansion of the BN's operations in the Powder River Basin ("PRB") of Wyoming to include coordination of the joint line with Chicago and North Western Railway Company ("CNW")/Union Pacific ("UP"). From 1995 through 1996, he was Vice President of Burlington Lines, responsible for the total transportation function for one-third of the BNSF Railroad, including major terminals, mechanical, engineering and operations. Mr. Mueller retired from BNSF in 1996. From May, 2000, through April 30, 2001, he held a one-year assignment as Vice President and Chief Operating Officer of the Alaska Railroad. He was responsible for all aspects of operation for the Alaska Railroad, including operations, engineering, mechanical, marketing and safety.

Mr. Mueller is sponsoring evidence relating to operations of the stand-alone railroad. His evidence is incorporated in Sections III.B.2, III.B.3, III.C and III.D.3 of the Narrative. Mr. Mueller has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

13. Loren E. Mueller

Loren E. Mueller is a railroad transportation consultant. His business address is 614 Regency Crossing, Southlake, TX 76092. Mr. Mueller was employed by BNSF and its predecessors for 32 years. His management positions with the Burlington Northern Railroad began in 1975 as yardmaster at Lincoln, Nebraska. He held a number of positions with the railroad. From 1992 to 1994, Mr. Mueller was General Manager - Coal Operations, responsible for operations of the BN system coal business unit. During this time, he directed major construction and expansion of the BN's operations in the Powder River Basin ("PRB") of Wyoming to include coordination of the joint line with Chicago and North Western Railway Company ("CNW")/Union Pacific ("UP"). From 1995 through 1996, he was Vice President of Burlington Lines, responsible for the total transportation function for one-third of the BNSF Railroad, including major terminals, mechanical, engineering and operations. Mr. Mueller retired from BNSF in 1996. From May, 2000, through April 30, 2001, he held a one-year assignment as Vice President and Chief Operating Officer of the Alaska Railroad. He was responsible for all aspects of operation for the Alaska Railroad, including operations, engineering, mechanical, marketing and safety.

Mr. Mueller is sponsoring evidence relating to operations of the stand-alone railroad. His evidence is incorporated in Sections III.B.2, III.B.3, III.B.4, III.C and III.D.3 of the Narrative. Mr. Mueller has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on July 18, 2005

Loren E. Mueller

14. Deborah G. Newland

Deborah G. Newland is a Senior Consultant with FTI Consulting, Inc., an economic and financial consulting firm with offices located at 1201 Eye Street, N.W., Suite 400, Washington, DC, 20005. Since 2001, Ms. Newland has been involved in various aspects of transportation consulting, including detailed cost analyses for several of the country's largest railroads, studies of historic rail rates and long term coal traffic and revenue forecasts, and extensive statistical analysis, such as modeling fuel consumption variation with cycle times and evaluating historical changes in rail transportation rates.

Ms. Newland holds a Bachelor of Arts degree in Economics from Furman University, graduating *cum laude*. She has also received a Masters of Science degree in Economics from the University of North Carolina at Chapel Hill, and has also completed extensive econometric coursework at the doctoral level, covering such topics as measure-theoretic probability, statistical theory, and applied econometrics. Since joining FTI in 2001, Ms Newland has performed economic and financial consulting services to regulated and newly deregulated industries, including the transportation and postal sectors. Her focus is on costing and statistical analyses in support of expert testimony within regulatory proceedings, and she has assisted in the preparation of expert testimony in proceedings before the Surface Transportation Board and the Postal Rate Commission.

Ms. Newland is sponsoring evidence relating to BNSF's variable costs for the issue movement. Her evidence is contained in Section II.A of the Narrative. Ms. Newland has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on July 15, 2005

Deborah G. Newland

15. Robert J. Plum, III

Robert J. Plum, III, is a Managing Director of FTI Consulting, Inc. ("FTI"), with offices at 1201 Eye Street, N.W., Suite 400, Washington, DC 20005. Mr. Plum holds a Bachelor's Degree in Accounting and an MBA degree with a concentration in finance. He began his career in 1979 with Wyer Dick & Company, a consulting firm that specialized in railroad costing issues. Since that time he has been involved continuously in analyzing accounting, cost, financial and engineering issues associated with railroad operations and pricing. He has conducted numerous variable and stand-alone cost studies, conducted and evaluated railroad contract provisions, field studies of railroad operations, and developed computer models to evaluate railroad engineering and operating requirements.

Mr. Plum is sponsoring evidence relating to the number of locomotives and railcars required by LRR and, LRR locomotive and railcar operating expenses. His evidence is incorporated in Sections III.C.1, III.D.1 and III.D.2 of the Narrative. Mr. Plum has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on July 15, 2005

Robert J. Plum, III

16. James Primm

James Primm specializes in all aspects of railroad engineering, specifically in the design of maintenance facilities for, and the procurement of, railcars and locomotives. He is currently working on contract for BNSF Railway. Mr. Primm has supervised the design of the locomotive maintenance facility renovation projects and has helped procure over 1,300 unit train coal cars.

Among Mr. Primm's many engineering achievements are the direction of design and management of construction of the North Kansas City Locomotive Facility at North Kansas City, Missouri, the Corwith Locomotive Maintenance Facility at Chicago, Illinois, the Barstow Locomotive Facility in Barstow, California, the Hinkle Locomotive Facilities in Hermiston, Oregon, and Topeka System Maintenance Terminal Renovation in Topeka, Kansas. He has also prepared conceptual designs for high speed train maintenance facilities and recently completed a conceptual design for a future locomotive maintenance facility near the Powder River Basin..

Mr. Primm has authored numerous transportation studies, as well as managed geotechnical and environmental investigations. He received his Bachelor of Science in 1973 in Electrical Engineering from the University of Oklahoma. He is a former member of the American Railway Engineering Association, the American Welding Society, the Locomotive Maintenance Officers Association, and the International Association of Railway Operating Officers.

Mr. Primm is sponsoring evidence relating to Section III.F.7 Buildings and Facilities. Mr. Primm has signed a verification of the truth of statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on July 12, 2005

James F. Primm, II

James Primm

17. Arnold S. Tesh

Arnold S. Tesh is a real estate consultant and certified real property appraiser at FTI Consulting, Inc., an economic and financial consulting firm. His business address is 1201 Eye Street, N.W., Suite 400, Washington, DC 20005. He has been valuing real estate for more than thirty-seven years. He has spent twenty-five years performing property appraisals for use by railroads. He served as the Director of Real Estate in the Law Department of the United States Railway Association during the proceedings that resulted in the creation of Conrail. In that proceeding, he directed the valuation of nearly 24,000 miles of railroad in seventeen states, the District of Columbia, and two Canadian provinces, comprising the lines of Penn Central, Erie Lackawanna, Central of New Jersey, Ann Arbor, Lehigh Valley, Reading, and Delaware and Hudson railroads. The methodology that he developed in that case, and which formed the basis of his Special Court testimony under the Regional Rail Reorganization Act of 1973, employs the same valuation principles he uses here.

Mr. Tesh has also performed real property appraisals for railroad lines used by Amtrak, Union Pacific, Southern Pacific, Illinois Central Gulf, Santa Fe, Burlington Northern, CSX, and other railroads. His experience also includes appraising commercial, industrial, residential and agricultural properties located throughout the United States, as well in the Caribbean, Canada, Mexico, and Central America.

Mr. Tesh is a Counselor of Real Estate ("CRE") of the American Society of Real Estate Counselors and a General Accredited Appraiser of the National Association of Realtors. Only about 1,100 real estate experts in the world have earned the CRE designation. He has also served as an officer in various real estate associations and has his certification to appraise real estate in many states.

Mr. Tesh is sponsoring evidence relating to road property investment in land. His evidence is contained in Section III.F.1 of the Narrative. Mr. Tesh has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I ~~am~~ qualified and authorized to sponsor this testimony.

Executed on July 15, 2005

Arnold S. Tesh

18. Heather S. Viola

Heather S. Viola is a Manager at FTI Consulting, Inc., an economic and financial consulting firm. Her business address is 1201 Eye Street, N.W., Suite 400, Washington, D.C. 20005. Ms. Viola holds a Bachelor of Arts degree in Economics from Wellesley College. Since 1997, Ms. Viola has worked with clients in the telecommunications, railroad, aerospace, electronics, home construction, and plastics industries. Her work has included damages analysis, market entry analysis, and pricing and costing analyses.

Ms. Viola joined FTI Consulting in 2001. While with FTI, Ms. Viola has provided technical support in several proceedings before the Surface Transportation Board, Federal Communications Commission, and various State Utility Commissions. She has assisted in the preparation of expert testimony for maintenance of way expenses in stand-alone cost proceedings since 2002 including the *Duke Energy Co. v. CSX Transp. Co., Duke Energy Co. v. Norfolk Southern Ry, Co., and Carolina Power & Light v. Norfolk Southern Ry. Co. PSC, Otter Tail, AEP Texas and AEPCO* cases.

Ms. Viola is sponsoring evidence relating to LRR operating expenses. Her evidence is incorporated in Sections III.D.1-4 and III.D.5-9 of the Narrative. Ms. Viola has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on July 13, 2005

Heather S. Viola

19. David R. Wheeler

David R. Wheeler is the founder and President of Rail Network Analytics. His business address is 9222 Nottingham Way, Mason, OH 45040. Mr. Wheeler received a Bachelor of Science degree in engineering and computer science from Merrimack College in 1985. He also received a Masters of Business Administration degree in finance and operations management from Miami University in 1992. He has training in Six Sigma methodology and holds a Six Sigma Blackbelt certification.

Throughout his career, Mr. Wheeler has focused on advanced analytical techniques for operational improvement and strategic planning. He has more than fifteen years experience in areas including rail operations analysis, capacity analysis, simulation, stand-alone rate case litigation, structured problem solving using the Six Sigma methodology, supply chain efficiency and mergers & acquisitions. Mr. Wheeler has experience not only in the simulation and analysis of railroads, but also in other high technology industries including cockpit simulation work on the F-16 and F-22 fighter aircraft.

Mr. Wheeler held a number of leadership positions within the Union Pacific Railroad Company (UP). During his tenure with UP, Mr. Wheeler led teams within Finance, Capacity Planning, Network & Capital Planning and Network Design & Integration. He has submitted testimony in previous stand-alone cost cases and presented research in a variety of forums. As General Director, Capacity Planning & Analysis, Mr. Wheeler was responsible for and led the capital planning function for UP's annual capital development and implementation. In this capacity, Mr. Wheeler analyzed and directed spending of more than $300 million for Powder River Basin coal traffic. Mr. Wheeler uses simulation tools on a regular basis and has conducted a number of simulation benchmarking studies to determine and lead vendors toward simulation improvements.

Mr. Wheeler has worked on a variety of projects in the railroad industry. Mr. Wheeler developed UP's Colorado/Utah coal capacity plan and guided the Intermodal growth capacity initiative from Chicago to Los Angeles across UP's Sunset and Tucumcari routes. He has worked on multiple projects for the BNSF, NS, CSX, CP and CN, as well as the many short lines that connect with the UP. Mr. Wheeler has also led teams working on proposals for new passenger service for Amtrak, various commuter agencies, and UP's Joint Facilities, Finance, Operations and Engineering groups.

Mr. Wheeler is sponsoring evidence relating to the LRR's capacity requirements and cycle times. His evidence is contained in Sections III.B.2, III.B.3 and III.C.2 of the Narrative. Mr. Wheeler has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on July 18, 2005

David R. Wheeler